depend more on the form of instrument shown on Fig. 3, where the pressure was measured by a gauge, and the corresponding temperature read off. I have made many experiments with a thermometer without the outer jacket, but fitted with an adjustable indicator, and after one or two trials with a new instrument, I found it was not necessary varying the indicator, the metal receding to a fixed point. Of course this was only in taking occasional measurements of temperature, where the instrument would only be a few minutes in contact with the heated body. This instrument is shown on Fig. 8. So far as variation is concerned, the only provision to be guarded against is the expansion of the metal forming the walls of the bulb, but this applies to the ordinary glass thermometer as well, and the variation is so small as to be immaterial.

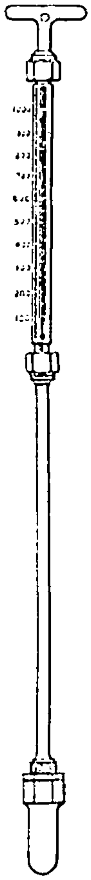


Fig. 8.

Obituary.

Dr. ADRIAN BLAIKIE.

At the early age of 29 years, this promising young chemist passed away on the morning of Saturday, the 7th of February.

Dr. Adrian Blaikie was the fourth son of the Rev. Professor Blaikie, of the New College, Edinburgh. He received his school education in the Edinburgh Academy and Fettes College. When he was eighteen he went to Stuttgart, where he studied chemistry under Professor von Marx, during two years. Returning to Edinburgh, he entered on the science curriculum in the University, where he successively took the degrees of Bachelor and Doctor of Science. His success as a student is shown by his having been awarded the Baxter Physical Science Scholarship, and the Hope Chemistry Prize, at that time the two highest honours attainable in his special department; and his powers as an original investigator were proved by a series of papers on certain organic compounds of sulphur, the joint work of Professor Crum-Brown and himself, published by the Royal Society of Edinburgh, during the years 1877–9. After holding for one year the post of Lecturer on Chemistry at the University College of Bristol, Dr. Blaikie was appointed by the Government to assist the late Dr. R. Angus Smith in his important duties as the General Government Inspector of Alkali Works. To that work Dr. Blaikie brought skill, industry, and enthusiasm; so that he soon became, not only the official assistant, but the trusted friend of his chief. On the death of Dr. Smith, in May of last year, Dr. Blaikie was promoted in the service to the responsible position of the Inspector of the Tyne district; and in August he entered with ardour upon his new duties in Newcastle. But these were not to last long. Dr. Blaikie had never been very strong; and in the last week of November he was seized with an intermittent fever, which, after a lingering illness, resulted in his death early on Saturday morning, 7th February, at his father's house in Edinburgh. This event has deprived many of a friend, endeared to them by his refined and winning nature, and has cut off a young life of great promise.

Journal and Patent Literature.

I.—GENERAL PLANT, APPARATUS, AND MACHINERY.

Improvements in Apparatus for Purifying and Softening Water for Steam Boilers, Laundry and Other Purposes. H. J. A. Bowers, Acton. Eng. Pat. 481, Jan. 3, 1884.

The inventor separates the mineral and other impurities from the feed-water before its entry into the boilers, by first conveying it into a large pipe fixed in the steam space of a boiler. This pipe presenting a considerable surface to the steam in the boiler, the temperature of the water passing through approximates closely to that of the steam; the mineral and other impurities, which are liable to form scale or deposit in boilers, are thus rendered insoluble. The feed-water now passes from the pipe into an apparatus called the separator. This consists of two vertical chambers standing upon, and connected with, a lower vessel, which tapers downwards to a small outlet provided with a cock or valve. The feed-water enters at the top of the smaller vertical chamber, passes from thence into the lower vessel, in which the heavier insoluble particles are deposited, and then finds its way into the larger vertical chamber, entering at the lower end. This chamber contains suitable filtering materials, through which the water finally passes in its upward course, previously to its delivery into the boiler. The heavier impurities are drawn off from the lower tapering vessel by means of the blow-off cock or valve.—E. G. C.

Recent Improvements in Thermometrical Apparatus.

Dingl. Polyt. Journ. 254 [4], pp. 158-161.

The pyrometer of Tremeschini (*Portefeuille économique des Machines*, 1884, vol. ix. p. 64) measures a rise of temperature by the expansion of a thin platinum foil. On using the apparatus, the scale A, sliding on B (Fig. 1), is placed opposite the zero-mark *a*. A copper rod H, surrounded by an iron tube G, is inserted into the space whose temperature is to be taken, and as soon as it has absorbed the necessary heat it is quickly withdrawn by means of a handle K, in such a manner that it faces the platinum foil *n*. The latter being fixed to c, its expansion is transmitted to the lever *o p*, which turns the finger *z*, and thus indicates the temperature on the scale A.

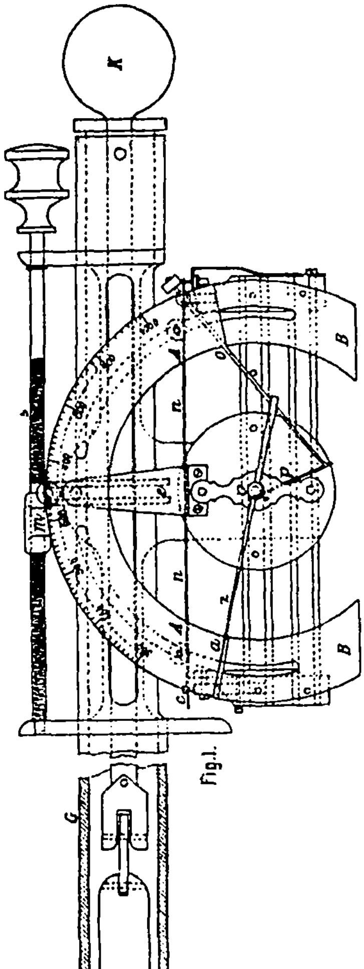


Fig. 1.

In the same French journal a description of Trampler's graphite pyrometer is given, which is similar to that known in commerce as Steinle and Hartung's patent.

Ducomet uses fusible alloys for the determination of high temperatures. Between a nut *z* and a tube A (Fig. 2), infusible rings, and such fusible at known temperatures of 5mm. height (*n* and *r*), are alternately inserted in such a manner as to stretch a spring *s*, which is in connection with a transmitting arrangement. By means of the nut *a*, the finger is fixed at the zero-mark. If now f. i. rings be used, which fuse at 200°, 400°, and 600°, the rod *c* will rise 5, 10 and 15mm. as soon as a temperature has been reached at which the rings fuse. The contrivance, therefore, only shows the highest temperature.

Guichard and Co. describe, in the *Revue industrielle*, 1884, p. 161, a finger-motion for metal-thermometers by means of a spring made of several metals. Such pyrometers are known to be very unreliable.

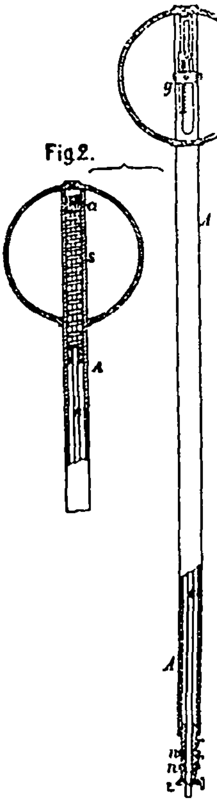


Fig. 2.

A. and E. Boulier, of Paris, have improved their water-pyrometer. The water which absorbs heat from the space whose temperature is to be measured, say a furnace flue, runs through the tap H (Fig. 3) into the pipe R, which is placed in the flue. From here it returns through pipe *r* into the receptacle N, where its heat is measured by a thermometer. It then travels through the tap O to the cup K, which is fastened to a beam, and held in equilibrium by a sliding weight T. A pliable rod *p* is fixed to the fulcrum of the beam in such a manner that it can first come into contact with the pin G, and then with F, as soon as the beam E swings owing to a decrease of weight at K. If, in consequence of an obstacle in the pipes, or owing to any circumstance the quantity of water entering K decreases, *p* and G come into contact, whereby an electrical alarum bell L is set in motion. If the water further decreases, *p* also touches the pin F, which causes the weight J to shut off the water at H. The pipe R, and all others conducting water from the flue to N, are covered with a non-conducting substance in order to avoid loss of heat.

R. Fluess, of Berlin (Germ. Pat. No. 26,606, 1883), has patented a maximum and minimum thermometer, in which the bulbs are filled with mercury, whereas the capillary tube contains an alcohol thread which is interrupted by a short mercury thread, which latter serves to move the indicators. The real thermometrical substance in this case is mercury. If the length of the mercury thread be equal to 10 degrees of the scale, it is evident that the maximum and minimum scale will differ by 10 degrees, Fig. 4 shows such an instrument, whose mercury vessel A is forked for increasing its sensibility. The capillary tube B is filled with alcohol, and ends at the top in an enlargement which holds some air. The mercury thread c pushes the minimum mark n downwards, and the maximum mark x upwards.

size. The upper part of the cylinder is made into a settling tank, and a strainer placed between it and the hollow tube—in this case concentric with the screwed spindle—so that the solid matter is in part removed before the liquid is supplied to the filter bed underneath the revolving cutter plate; the filter therefore lasts a much longer time than it otherwise would without such provision. The patentee claims—(1) generally, the modifications as described; (2) the special form of apparatus illustrated in the filed drawing.—C. C. H.

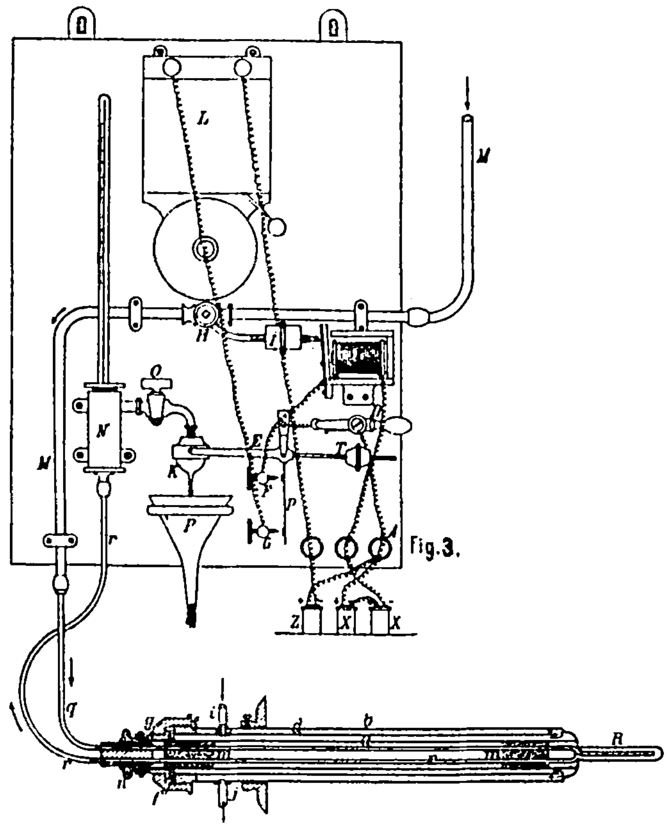


Fig.3.

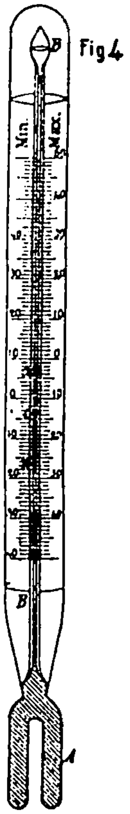


Fig 4

According to J. M Crafts (*American Chem. Journ.* 1884, p. 307), the gradual rise of the zero-point in new thermometers is not caused by the air-pressure, but by the compensation of the tensions in the glass of the thermometer bulb. Thermometers filled with air show the same behaviour as those void of air. It is recommended to heat new instruments for some time at a high temperature before providing them with a scale, and use for fixing high degrees the boiling points of naphthalene (218·1°) and benzophenon (306·1°).—S. H.

Improvements in Filtering Apparatus. J. F. C. Farquhar, London. Eng. Pat. 3234, February 13, 1884.

THE subject of this invention is improvements in that class of filtering apparatus know under the name of the patentee, and for which former letters patent were granted. In this apparatus the filter bed is placed at the bottom of a cylindrical vessel, the upper surface thereof being scraped off by means of a revolving head carrying a cutter plate so that a clean filtering surface is always preserved; the liquid operated upon being introduced under pressure through a hollow screwed spindle, which at the same time advances the cutter plate beforementioned. In the present case, whilst preserving the same general form of apparatus, certain modifications are introduced in order to enable the filter to deal more successfully with liquids containing either a large percentage of suspended matter or bodies of a considerable

Improvements in Apparatus for Distilling Liquids, for Purifying Gas, etc. H. H. Lake, London. Communicated by P. A. Mallett and T. A. Pagniez, Paris. Eng. Pat. 3452, February 16, 1884.

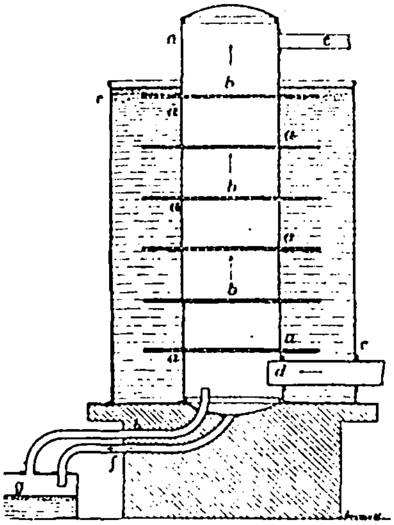
THE ordinary apparatus in use for distilling thick pasty liquids, or those which contain much solid matter, are liable to the objection that deposits take place on their surfaces which cause obstructions in the proper working of the apparatus. The patentees in this case propose to remove such deposits, mechanically, as soon as formed, and for this purpose they construct a still as follows:—A column is built up from a number of segments, a rotating shaft passing through the whole. Trays for the reception of the liquid in its passage through the still are fixed alternately to shell of the column and the rotating shaft; their shape conical, the passage of the liquid being through the centre of the fixed tray and over the lip of the rotating tray. Scrapers keep their upper surfaces clean, and are so shaped that the material flowing on to the fixed tray from the lip of the rotating one is drawn towards the centre and passes through on to the surface of the rotating tray, the scraper running on which is so shaped that the matter is expelled over the edge of the tray on to the next fixed table and so on through the whole apparatus. A modification for liquids of a less viscous character is also described. Baffle plates cause the gas used for the operation to pass through the body of the liquid in bubbles during its passage through the still. The claims are (1) in a distilling column the combination of the rotating and fixed conical trays and spiral scrapers; (2) the arrangement of the conical scrapers; (3) the modifications as shown for liquids of a less viscous character.—C. C. H.

Novel Apparatus for Chemical Works. Dingl. Polyt. Journ. 255 [2], 71.

CH. A. BURGHARDT has patented (D. R. P., No. 29,155, January 24, 1884) a compound condenser with perforated plates, for the recovery of naphtha, benzol, and other solvents used in the caoutchouc industry.

The condenser consists of several circular tubes *a*, connected together to form a long vertical condenser, the tubes are separated by circular perforated plates *b*, which being of greater diameter than the condenser have their outer rims cooled by the water in the outer cylinder *c*. The condenser is thus divided into several chambers. The vapours pass in at *d*, and are drawn through the apparatus by connecting the upper part at *c* with a draught. The condensed liquid flows by means of the tubes *f* and *h* into the receiver *g*.

FIG. 1.



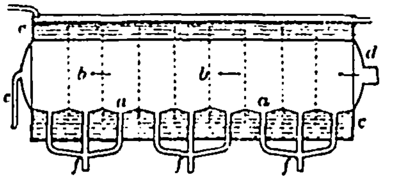


FIG. 2.

By erecting the condenser horizontally as in Fig. 2, the condensed liquid collects between the plates *a* by the three tubes *f* in three different states of purity.

A separating filter has been patented by C. Pieper in Berlin (D. R. P., No. 28,086, January 1, 1884). It consists, as shown in Figs. 3 and 4, of a frame *a*, in which vertical walls *b* are placed to support the filtering cloths *c*. The liquid enters the centre of the frame by the tube *d*, and is drawn off from the taps *c*, situated at the top and bottom of the apparatus.—S. R.

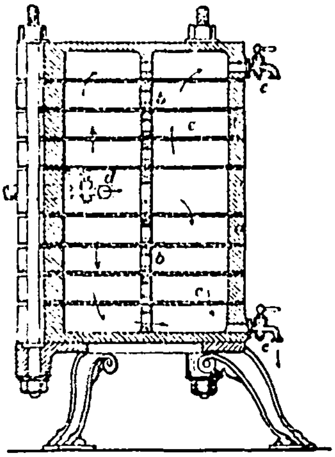
Improvements in Making and Working Filter Presses. James Pedder, Widnes. Eng. Pat. 3465, February 18, 1884.

THE improvements embodied in this specification are: (1) constructing filter-plates having a roll of flexible jointing material laced to a bead or projection formed on the joint surface of the plate; (2) securing the cloths used for filtering to a ring which fits tightly inside the frame portion of the plate, and holding the cloth against the filtering surface of the plate; (3) washing the soluble portions of the material under operation from the residue left in the press by first partially filling the chambers and then forcing the washing liquid through the sides of the unformed cake adhering to the cloths on each side of the chamber. The patentee claims as novel each of the improvements as above specified.—C. C. H.

Improvements in Filters. F. B. Hill, New Cross Gate, Surrey. Eng. Pat. 3578, February 19, 1884.

THIS patent is for improvements in water-filtering apparatus. The block of filtering material is placed in the interior of a containing vessel so that a narrow space exists only between it and the walls of the vessel. When the surface of the block has become coated, a rapid current of water is admitted through a tube in the upper part of the vessel, the direction of the axis of the pipe being on one side of the vessel, and not radially to the surface of the block; a surging gyrating motion of the water is thus produced in the narrow space which more effectually cleanses the surface of the filtering block. The dirty water is led away by a pipe at the bottom of the apparatus. The claim is a general one covering the construction of the filter as above described.—C. C. H.

FIG. 3.



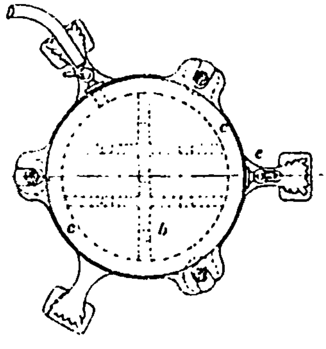


FIG. 4.

Improvements in Treating Liquid or other Materials to Concentrate and Dry the same, and Apparatus therefor. J. B. Alliott, London. Eng. Pat. 3656, February 20, 1884.

THIS invention has special reference to those appliances in which semi-liquid matter is dried by means of currents of heated air or gases brought into direct contact with the surface of the material, and is more particularly applicable to materials such as sewage or pail emptyings, which give off offensive odours during treatment. The patentee provides (1) a furnace which is used for heating a boiler or other useful appliance; (2) a pair of regenerative chambers through which the heated air from the boiler can be passed alternately, and which can also be put into communication with the chimney or a flue leading to the evaporating apparatus; (3) the drying vessels of the kind known as "Harescough's"; (4) the condensing apparatus; (5) a fan for drawing a current of air through the whole system. The exit pipe from the last piece of apparatus is in communication with the combustion chamber of the furnace. Supposing the dryers to be charged and the furnace in operation, the mode of working is as follows:—The fan is set in motion, and that part of the regenerators which has been previously charged with the heat is open to the air; the current of air passing into the chamber is heated to the temperature of the heated surfaces or nearly so, and being led from thence to the dryers over the surface of the material, takes up the water therefrom. Passing on into the condenser the moisture is removed, and the noxious vapours capable of being so condensed also removed; it is drawn from thence by the fan and forced into the combustion chamber of the furnace, where all gaseous bodies are thoroughly purified by the action of the heat. After doing useful work on a boiler or other useful appliance, the heated air is passed into the cooling chamber of the regenerator, where it gives up its heat to be transferred in its turn in a similar manner to the drying apparatus as first described so soon as the first chamber has cooled below its point of useful effect. The air is finally discharged into a flue leading to a shaft. The claims are (1) the mode of using air for the purpose and in the manner described; (2) using the products of combustion for heating regenerative chambers as described; (3) the combination of the different apparatus described as and for the purpose specified.—C. C. H.

Improvements in Filtering Apparatus for Gas, Air, Steam, and other Fluids. E. Capitaine, London. Communicated by Dr. Moeller, Kupferhammer, Germany. Eng. Pat. 3877, February 25, 1884.

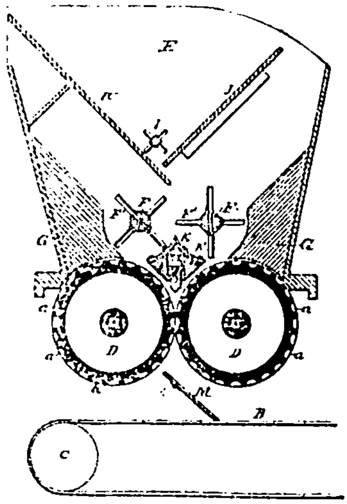
THE filtering apparatus consists of a casing holding a frame, on which is disposed the filtering material made from any suitable material, and arranged in the form of pouches projecting into the interior of the casing upon which and the fixed frame it is secured by a movable frame. In some cases the pouches are kept open by a frame in their interiors. A similar apparatus in which the filtering material is arranged in the columnar form, is also described and illustrated. The patentee claims as novel (1) the pouch-like arrangement of the filtering material; (2) the suspension of the filtering media between two frames; (3) the arrangement in a pillar form; (4) maintaining the media in position by means of frames.
—C. C. H.

Improvements in Apparatus for Mixing or Disintegrating Fluids and Semi-Fluid Substances. R. McNichol and I. Walsh, Manchester. Eng. Pat. 7680, May 14, 1884.

THE apparatus consists of a cylindrical vessel provided on the exterior with a cover, and in the interior with three or more discs, one of which is joined to the cover by a tube, and the remainder to a rod entering the centre of the apparatus. The rims of the latter discs are furnished with slits inclined at right angles to each other in alternate discs. The rapid raising and lowering of the rod forces the material operated on through the inclined slits, thus producing rapid and effectual mixing. The points claimed as novel are (1) the apparatus described and shown in the drawings; (2) the use of diagonal slits in discs for the purpose set forth; (3) the use of the double lid.—C. C. H.

Apparatus for Moulding Artificial Fuel, etc. F. Loiseau, Philadelphia, U.S.A. Eng. Pat. 12,202, Sept. 9, 1884.

THIS invention relates to that class of machines in which the granulated pulverised or plastic material is fed to and between revolving cylinders having in their surfaces pockets, which, as the cylinders rotate, coincide with each other to form moulds for the material, the improvements being in the construction of these cylinders, and in the use in the hopper of a certain filling block and feed regulator, whereby the accumulation of the material above the cylinders is prevented, and the amount of material fed to the cylinders readily gauged so as to prevent undue excess.



The figure shows a transverse section of the apparatus. The composition is first stirred and brought to a granulated condition in the upper compartment of the hopper E by the blades of the horizontal shaft I, and when delivered into the lower part of the hopper, it is maintained in this condition by the stirring blades F. Underneath the revolving blades and somewhat above the point of contact of the moulding drums D, a feed regulating device K is suspended. This is composed of a stationary block K¹ and a movable block K². The material is moulded by the cavities in the drums D, and the blocks formed are delivered along an inclined screening chute M, on to the revolving apron beneath.—J. T.

Improvements in Apparatus for Compressing the Condensible Gases. S. Pulpett, Westmoors, Knowle. Eng. Pat. 12,543, September 18, 1884.

IN the compression of the condensable gases heat is evolved, and in order to absorb this heat and to secure isothermal compression, a small quantity of the liquefied gas is sometimes injected into the cylinder during a part of the stroke. The present invention is to effect this automatically and in the correct quantity. To carry this into effect, the patentee provides a valve working either with a transverse or rotary motion, actuated intermittently by any suitable mechanism, enclosed in a casing in communication with the condenser in which is stored the liquefied gas. At a certain interval in the stroke the valve opens a passage into the cylinder, and a small portion of the liquefied gas is, by the superior pressure in the condenser, forced into the compression cylinder, and thus by its vapourisation secures the desired cooling effect. The claims are (1) utilising the pressure of the condenser for the purpose specified; (2) the valve for the same purpose moving transversely as shown in the drawings filed; (3) a cylindrical valve having a rotative reciprocating motion for the purpose set forth and described.—C. C. H.

A Composition for Preventing and Removing Incrustations in Steam and Other Boilers. Geo. Iles, Weeks Hill, and Thos. Morgan, Oldland, both in county of Gloucester. Eng. Pat. 750, October 2, 1884.

THE composition is called Iles and Morgan's Anti-Scrupp or Decrustation Composition, and consists of

Carbonate of Potash	10	parts per 100
Sulphate of Potash	5	,, ,,
Chloride of Potash	5	,, ,,
Carbonate of Soda	20	,, ,,
Decoction of Hematoxylin	30	,, ,,
Lime Water	30	,, ,,

It is to be used in the proportion of half a pint per horse-power per six working days of twelve hours each.

—A. R. D.

Apparatus for Purifying Glycerine and other Substances. A. M. Clark, London. Communicated by F. H. Houghton, New York. Eng. Pat. 13,925, October 21, 1884.

THIS invention consists principally in combining a still which receives the impure glycerine with apparatus for supplying steam to such still, with a system of condensers and with an evaporator in which the products of condensation are freed from water.—J. T.

II.—FUEL AND LIGHT.

Some Experiments on Mineral Oil Lamps. By L. Schmelck. Dingl. Polyt. Journ. 255 [1], 39, and [2], 78.

THE author considers the effect of different oils, wicks, and chimneys in relation to some of the modern lamps used for burning mineral oils.

(1.) *Oil and Wick.*—The power with which the oil is drawn up the wick, diminishes as the oil is consumed, owing to the increased friction causing the velocity of the stream of oil to become less. The gradual removal of oil, of course, diminishes the luminosity of the flame, but the diminution is found to vary with the quality of oil employed. As vegetable oil, rape seed for example, is more viscid than the common mineral oil, specially constructed lamps should be used. Beilstein (Dingl. Polyt. Journ. 1883, 250, 169) has shown that the Russian oil, although the heavier, is more readily sucked up by the wick than the corresponding American oil.

The flame of a lamp increases in brilliancy for the first twenty minutes or so, till the lamp has acquired a uniform temperature, it then remains constant for about two hours, then begins slowly to diminish. To remedy this the wick is raised; if raised too high a crust forms on the top of the wick which, by stopping up the pores of the capillary channels, prevents the proper ascent of the oil. The different constituents of the oil appear to be sucked up at different rates. This is shown by a table giving the specific gravity of different oils, after different percentages have been consumed. Other things being equal, the luminosity of a flame depends on the breadth and strength of the wick; with three different kinds of wick, no difference was noticed in the rate at which they absorbed oil. As water prevents the rise of oil in the wick, all wicks should be well dried before use. After a while, a wick is impaired from the stoppage of its capillary tubes by particles of dirt drawn up by the oil in ascending. Experiments with incombustible wicks did not lead to any very satisfactory results. Lamps for preventing the sinking of the level of the oil, as used for vegetable oils, are not to be recommended for mineral oils for domestic purposes; they are used, however, in lighthouses. Ditmar uses in his lamp two wicks, one to supply the oil, the other to burn. The former of these is the stronger and reaches to the bottom of the lamp, the latter is shorter and is surrounded by the other at the top. If both wicks are of the same breadth, twice the quantity of oil is used in the same time. The best form is that known as Ditmar's "Sunburner B," with 15mm. burner.

(2.) *Burner and Chimney.* To obtain the maximum effect a fixed relation must be observed between the size of the flame and the amount of air admitted. An increase in the height of the chimney, of course, augments the velocity of the stream of air. If the chimney be lengthened without a simultaneous screwing up of the wick, a smaller but relatively brighter flame is produced. A greater current of air may possibly cause the particles of carbon to be a shorter time in the flame.

From a series of experiments with a *Reform burner* and *Kaiser oil* the author shows that the relative increase of brilliancy with a long chimney does not compensate for the diminution in the size of the flame. With a greater current of air, the consumption of the oil is quicker, and the intensity of the illumination less. The shape of the chimney is important. In round burners, as in the cosmos, the chimney causes the flame to contract in size. The fault with this and the Reform burner, which consists of a cosmos burner with a tube for the addition of more air to the interior flame, and for supplying the two sides of the flame with air at the same rate, lies in the chimney. The contraction being always at the same height does not vary with the height of the wick within. Rasch has tried to obviate this difficulty by a mechanical arrangement.

To bring air into the flame, the well-known burning plate is used in French lighthouses, and can be fitted to Ditmar's lamp, "Sunburner A," which is then used without the absorbing wick. In this lamp the chimney is not so contracted as in the cosmos, but has somewhat the shape of the old moderator lamps.

In the *Vulcan-cosmos burner* a large burning plate is used, which necessitates an enlarged chimney; one of these lamps burns one-third as much again of oil as the ordinary cosmos burner. The sinking of the oil so rapidly will therefore cause this flame to lose its brilliancy and intensity quicker than the other.

The *Mitrailleuse burner* burns, under favourable conditions, a little better than the cosmos burner, although the proper flow of oil is somewhat retarded by the metal fastening of the wick.

Amongst burners with flat wicks, the Duplex burner is still the best. It burns, however, 70grm. of oil per hour, about twice as much as a cosmos burner with 10mm. diameter. Both brilliancy and intensity of illumination diminish during burning. Most flat burners have the fault of heating the burner too much.

The greatest intensity of illumination of all lamps is obtained when the oil burns with the greatest flame, and this can be obtained by raising the wick as high as possible without the lamp smoking. In this investigation a modified Bunsen's photometer was used, and the standard light was that of four candles, weighing 396 grammes, and burning 35·9 grammes per hour.—S. R.

On the Luminosity of Methane. Lewis T. Wright. Proc. Chem. Soc. [3], 21.

PURE methane was prepared by Gladstone and Tribe's method, by the action of the copper-zinc couple on methyl-iodide. The gas was obtained free from methyl-iodide vapour by passing it through tubes fixed in a horizontal position and packed with copper-zinc, which was kept moistened with alcohol, the alcohol vapour being removed by scrubbing with sulphuric acid. It was burned in a London Argand burner, the chimney of which was fitted with a cap for the purpose of limiting the air-supply to the quantity most favourable to the development of luminosity. The methane flame was compared with a Methven standard burner supplied with eighteen-candle gas—*i.e.*, with a light equal to two sperm Parliamentary candles. The results obtained were—

Rate of consumption per hour corrected to 60° F. and 30" B. cb. ft.	Candles observed.	Candles per 5cb. ft. per hour calculated.
2·78	2·9	5·20
4·46	4·6	5·15

The author will extend his observations to ethane and propane.—W.S.

Separation of Ammonia from Gaseous Mixtures. Dingl. Polyt. Journ. 254, 434.

H. WELLSTEIN describes the following process and apparatus for the purpose (Ger. Pat. 28,762, 1883), The lower bent portion of the tube *h* (Figs. 1 and 2), and the pulsometer P, are placed in a flue so that the contents may be heated. The gaseous mixture enters the chamber *c* by *a* and leaves by *h*, these tubes being provided with valves as shown in the figure. F is a reservoir of dilute sulphuric acid which flows into *c* by way of *h*, and is distributed as shown in the figure. When a sufficient quantity of the dilute acid has collected in the floor of *c*, the valve in W is forced open and the liquid flows to P, where it is heated until the vapour tension is sufficient to close the valve and force the liquid by way of *g* to the second reservoir F. The circulation is maintained in this way until the sulphuric acid is neutralised by the ammonia, when it is interrupted during the introduction of fresh acid.—C. F. C.

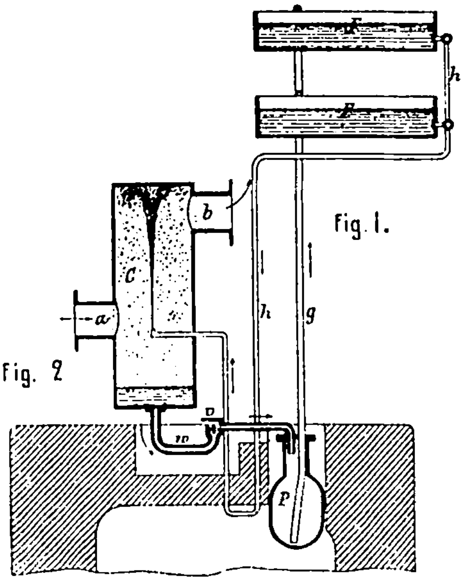


Fig. 1.

Fig. 2

Improvements in Self-acting Retorts for the distillation of Solid Substance B. P. Walker, Birmingham, and J. A. B. Bennet, King's Heath. Eng. Pat. 491, January 3, 1884.

THIS invention relates to retorts constructed in accordance with a previous specification (Eng. Pat. 335, 1883), in which the material to be acted upon is made to traverse the length of the retort by the action of a screw into the threads of which the material is supplied from a hopper. The object of the present invention is to prevent the material from being carried round by the screw through the interposition of obstacles which form stops or detents, it having been found that in distilling certain substances the action of the apparatus is impeded by the adhesiveness of the material at certain stages of the process. Parallel with the propelling screw there is a second screw having the same pitch and direction of threads, the screw being arranged so that its threads shall lie between those of the propelling screw. The inventors also arrange a wheel the circumference of which is formed into cogs to correspond and work with the thread of the second screw. The turning of the screw gives rotation to the wheel, and the cogs clear out any adhering matter which may have been carried round by the screws, the wheel revolving within the walls of a pocket attached to the tube in which the screw revolves.

—D. B.

Improvements in and Apparatus for the Manufacture of Gas for Lighting, Heating or other Purposes. Jno. Hy. Johnson. Eng. Pat 1193, January 10, 1884.

CONSISTS: (1) In injecting steam into the incandescent coke left in the retorts after the completion of the ordinary process of gas distillation, thus producing hydrogen and carbonic oxide. (2) In producing a gas of a higher illuminating power by injecting a liquid hydrocarbon into the coke left in the retort directly after the distillation of coal is completed. The gas produced may be mixed with the ordinary gas or with the water gas, produced as above described, according to requirements. (3) In the oxidation of the carbonic oxide contained in the gas mixture, which is produced in the first operation, to carbonic acid by passing that gas mixture, together with a further quantity of heated steam, through incandescent coke or through refractory materials heated in retorts. The latter operation may be carried out in a separate retort, into, and through which, the gas from the first operation is conveyed. From the gas produced in this manner the carbonic acid is removed by milk of lime, leaving thus pure hydrogen gas for use. The drawings illustrating the retort arrangement for this process are not of special interest.—C. C.

Improvements in the Treatment of Carbonaceous Substances in Ovens or Furnaces for the Conversion thereof into Combustible and other Products. H. Stier, Zwickau, Germany. Eng. Pat. 1198, Jan. 10, 1884.

ACCORDING to the present invention the construction of a furnace described by Glaser (Eng. Pat. 1962 of 1883) is made use of for treating carbonaceous substances in such a manner that after the removal of the volatile constituents by distillation, the residue is converted into combustible gas by admission of a regulated supply of air or steam into the incandescent mass, so that the operations of removing the volatile constituents and converting the carbonaceous residue into gas are effected consecutively in the same chamber of the furnace. To convert hydrocarbons such as mineral and other oils into aromatic substances, the hydrocarbons are introduced into the coking chamber filled with incandescent coke, the volatile constituents being condensed and permanent gases formed, whilst the solid residues in combining with the coke render this of a compact and improved quality. Carbonaceous substances such as lignite, peat, bituminous shales, which are not susceptible of coking, are treated in a similar manner, by first distilling from them the more volatile constituents, after which the residue is treated with air and steam for the production of combustible gases, which may be employed either directly for heating the coking chambers or for other purposes.

—D. B.

Increasing the Illuminating Power of Ordinary Coal-gas. Wm. Godson Little. Eng. Pat. 1578, Jan. 17, 1884.

DESCRIBES an apparatus for carburetting ordinary coal-gas. The hydrocarbon proposed to be used is creosote oil of 9° to 10° Tw. This is supplied to an evaporating apparatus of hemispherical form (the flat side downwards), in which it is exposed in layers of ⅜in. depth indirectly to the heat of the gas-burner placed beneath it. To moderate the direct action of the heat from the burner on the bottom of the carburetter, a movable sheet-metal screen is interposed between it and the flame. The screen only is heated and communicates the heat to the carburetter. The carburetter is kept supplied with creosote from a reservoir placed above it, from which it flows to the carburetter in the proportion in which it evaporates in the carburetter.—C. C.

Improved Retort for the Production and Revivification of Animal Charcoal from Bones. G. Valentine, Liverpool. Eng. Pat. 1669, January 18, 1884.

THIS invention, which consists of a system of cast-iron vertical retorts of improved form and construction, is not suitable for abstraction, as without the assistance of the accompanying drawings it is impossible to explain the mode of working the retorts.—D. B.

Collecting Explosive Gas in Mines. A. Shippey, London. Eng. Pat. 1752, January 19, 1884.

THE inventor proposes to place gas-collecting vessels in excavations made in the roofs of mine workings in order

to entrap the lighter and combustible gases, and to connect these vessels with gas-holders at the surface.
—J. T.

Improvements in the Method of and Apparatus for Preparing and Treating Oils and other like Substances for Industrial Purposes. Frank Wirth, Frankfort-on-the-Main. Communication from L. Starck, Mayence. Eng. Pat. 1823, January 21, 1884.

Liquid hydrocarbons or other oils and fatty substances, resins and bitumens which become liquid at a higher temperature than that of the atmosphere, are converted into a permanent solid form by mixing moss peat having a specific gravity of 0·09 therewith. About 100 parts of the latter mixed with from 400 to 600 parts of crude petroleum produce a fibrous mass which can be subjected to various temperatures in boilers, retorts or chambers, in order to separate the carburetted hydrogen disengaged, a furnace provided with iron or clay retorts laid in a horizontal position being used. This furnace, which has three series of retorts—viz., a central series and a series on each side of it—permits the retorts to be heated to any temperature ranging between 80 and 1800°. The central retorts are surrounded by a wall and are exposed to the direct action of the fire. Through the arch of the inner oven thus formed, the heat passes to the outer ovens, in which are placed the side series of retorts and around which the hot gases play previous to passing into flues which are provided with dampers. Where the temperature is lowest steam is admitted and, by reason of the low temperature, is condensed. Where the temperature is highest, carburetted hydrogen gas is evolved and either converted into lamp-black or mixed with hydrogen to form lighting or heating gas. The hydrogen gas is produced by decomposing steam or water in the central retorts. To produce large quantities of lighting or heating gas it is proposed to add to the moss peat saturated with oil 400 to 600 parts of fine coal. In the preparation of lighting gas, resins or similar substances may be used instead of crude petroleum. The lighting gas is purified by passing it through a mass of peat moss and lime, or gypsum. To bleach lubricating oils produced from crude petroleum the oily peat moss is treated with chloride of lime, the lubricating oil being extracted by steam heated to 250°.—D. B.

Combined Gas Producer and Steam Boiler. B. C. Sykes and J. Briggs, Cleckheaton. Eng. Pat. 2709, February 5, 1884.

The inventors surround a gas generator by a water jacket below and a steam space above, the arrangement much resembling an ordinary vertical boiler. The gases produced are drawn off from the upper part of the producer by tubes which pass vertically down through the water space.—J. T.

Gas Purifier Grids. H. J. Haddan, London. Communicated by John Calot, Massachusetts, U.S.A. Eng. Pat. 3223, February 13, 1884.

Each bar of the screen or grid is formed with, practically speaking, linear or very narrow bearings to rest against peripheries of each of the holes for supporting it, the bar being between such bearings without contact with the periphery or broadway of the hole; that is, the edges only of the bars touch the holes in the supports.—J. T.

Improvements in Carbonising Coal. J. G. Willans, London. Eng. Pat. 3520, February 18, 1884.

This invention relates to the carbonising of coal in gas retorts or in coke ovens. It consists in causing the vapour of water to be disseminated through the coal during the heat. A substance containing water is either placed underneath the coal or is mixed with it. In either case the water will be vapourised and disseminated through the coal during the heat. The substance employed may be slaked lime or other mineral substance containing combined or included water, or it may be a carboniferous substance such as moist or wet peat, or wet coal dust.—J. T.

Improvements in the Methods of Taking off the Volatile Products from Coal, Shale and other Hydrocarbons during the Process of Distillation. W. A. Byrom, Wigan and J. A. B. Bennett, King's Heath. Eng. Pat. 3736, February 22, 1884.

The object of this invention consists in removing from the retorts the various products of distillation, and thus preventing them from mixing and avoiding the subsequent expense of redistillation. A retort similar to that patented by Walker and Bennett is employed. In this retort a number of apertures are placed in a line along the highest part of the retort, and arranged in such positions as to be able to withdraw the products immediately they are liberated. This is effected by supplying each exit pipe with a bend of any suitable form, so that the pipe may ultimately be either inclined downwards or preferably point vertically downwards near the side of the retort, the exit pipe being of sufficient length to secure the condensation of the liquid portion of the distillate. The latter runs down the exit pipe and falls into a receiver, whilst for the removal of the gas each exit pipe is furnished with a lateral opening above the point where it enters the receiver. These openings are connected with a horizontal pipe through which the gas is drawn off by means of an exhausting apparatus.
—D. B.

Improvements in Method of and Apparatus for Washing and Purifying Coal-gas. J. F. Belfield, Exeter. Eng. Pat. 3870, February 25, 1884.

The apparatus consists of a series of horizontal trays, containing water, and having concentric rings of pegs. Above these trays are revolving discs with pegs on their under sides, alternating with those in the trays. The discs are rotated by an arrangement of levers and movable weight, and secondary steelyard adjustment for regulating back pressure.—S. R.

Producing and Burning Gas for Heating Purposes. L. D. York, Portsmouth, Ohio, U.S.A. Eng. Pat. 3939, February 26, 1884.

The gas generators are worked in pairs. Each is provided with a grate and closed ash-pit, and the two are connected above by a short flue, into which opens a small steam pipe. Air is forced beneath each grate alternately, and the gas produced is taken off below each grate alternately. Thus, the gas produced in the generator receiving air is passed downwards through the fuel in the other producer; and during the passage of the gas from one to the other, more or less steam is introduced by the pipe mentioned above.—J. T.

Condensing Apparatus for Purifying Coal-gas. W. T. Walker, London. Eng. Pat. 3987, February 26, 1884.

This invention relates to improvements in Walker's annular condenser (Eng. Pat. 545, 1880). The inner and outer condensing cylinders are so made that the space between them is conical, the narrower part being upwards to prevent the deposition of naphthalene between the cylinders. Large tar outlets are made direct through the bottom closures of the spaces between the cylinders. The bottom closures of the cylinders are inclined down to the tar passages. The cooling of the cylinders is effected by means of annular troughs placed at the upper part of the cylinders, with a filling of thick felt (or equivalent porous material) between these troughs and the surfaces of the cylinders; and through this felt the water percolates, and is distributed evenly over the whole surface of the cylinders.—J. T.

Apparatus for Carburetting Air. J. H. Johnson, London. Communicated by E. D. Deboutteville and L. P. C. Malandin, Fontaine le Bourg, France. Eng. Pat. 6052, February 26, 1884.

The apparatus consists of a vessel, preferably of cylindrical form, for containing the liquid hydrocarbon, divided internally by pendant vertical partitions, extending to within a short distance from the bottom, and preferably arranged in the form of a double spiral. The lower edges of these partitions are immersed in the liquid, and air is admitted at one side of the apparatus, and is compelled to follow the convolutions of the passages formed by the partitions, till it reaches the centre of the vessel, and then flows in the opposite direction to the outlet. Thus, the air is brought into contact with an extensive surface of the liquid hydrocarbon, whereby it is carburetted under very favourable conditions.—J. T.

Improvements in Gas Producers of the Siemens Type. James McFarlane, Motherwell. Eng. Pat. 4075, February 28, 1884.

By means of these improvements small coal or dross can be utilised in gas producers of the Siemens type, thus enabling such gas producers to yield a larger quantity of gas in a given time. The gas producers are constructed with an enclosed hollow bottom, underneath the bottom proper. Passages in the hollow bottom are connected with perforations in the bottom proper, and with side openings around the bottom. Air, or a mixture of steam and air, is injected by means of a steam blower through these passages into the small coal, and so converts it into gas.—S. R.

An Improved Method of Utilising the Waste Residues of Fuel. Eng. Pat. 4698, March 11, 1884.

Nine hectolitres of the waste are thoroughly mixed with a hectolitre of fine black coal, and nine litres of coal-tar, diluted with one litre of ordinary petroleum, are poured upon the mixture; after well stirring, a solution, containing 0·75 kilogrammes of calcined carbonate of sodium (dissolved in from 15 to 20 litres of water) is added, to form an emulsion, from which cakes are formed and dried. —S. R.

Improvements in the Process of Manufacturing Hydrocarbon Gas. E. A. Brydges, Berlin. Eng. Pat. 6455, April 17, 1884.

The object of this invention is to cheaply obtain an illuminating gas, pure and free from oxygen and carbonic acid gas. Superheated steam is passed over heated lime, to absorb oxygen and carbonic oxide; then over finely divided iron or copper; and finally over charcoal, to remove the last traces. The hydrogen so obtained is mixed with a liquid hydrocarbon, and then passed through a heating coil, which converts the mixture into a fixed gas. The gas is purified by passing through a washer and chamber supplied with hydrate of lime, ammoniac and water, or other suitable cleansing solution.—S. R.

Manufacture of Illuminating or Heating Gas and Apparatus for the same. A. J. Boult. Eng. Pat. 9084, June 17, 1884.

The generating and fixing chambers are heated, the one by the combustion of the fuel, the other by the products from such fuel. Steam is decomposed in the fuel, hydrocarbons are added, and the mixture fixed by passage through part of the heated material. Successive volumes of the gas are passed through succeeding parts of the heated material, thus preventing destructive decomposition of the hydrocarbons, and ensuring a gas of uniform candle power. To effect this, two generating chambers are used and operated reciprocally, the superheated steam being passed alternately down into one, and the resulting gases up through the other. The coal is also distilled alternately in the two chambers. The steam is decomposed by passing first through a bed of heated iron scrap, and then through the incandescent fuel. The oxidised scrap is reduced by subjecting it to the action of nascent carbonic oxide, which, in company with the other waste products of combustion, is passed up the superheating and decomposing chambers. Since this is reversible, the scrap can be used repeatedly without removal from the apparatus.—S. R.

Improvements in and connected with Retorts for obtaining from Coal or other Carbonaceous Substances Illuminating or Heating Gas, Oil, Coke and other Products. J. Hislop, Glasgow. Eng. Pat. 12,912, September 29, 1884.

The inventor employs fireclay retorts formed of one or more large pieces, or being wholly or partly built up of firebricks. The retorts are of oblong form in horizontal section, each having a passage formed down the inside of it by a small partition built near one of the narrow sides. The sides of the partition being perforated, the gas generated at any part of the retort has immediate access into the side passage. The latter communicates by a number of horizontal branch pipes with an external vertical pipe, which is, at its top, connected with a pipe leading from the top of the retort to the gas main, condensers and separating apparatus. On the outer side of the vertical pipe, and opposite the branch pipes, nozzles are fitted, provided with plugs, to facilitate the clearing of the horizontal connecting pipes. The retorts are arranged in various ways in connection with ordinary furnaces. A furnace may, for instance, be arranged to a set of four retorts, communicating directly with the bottom ends of the retorts, these bottom ends being nearly horizontal, and having short horizontal outlet parts, extending through the side walls of the building for the discharge of the coke or residues.—D. B.

Hydrocarbon Furnaces. H. J. Haddan, London. Communicated by A. N. Leet and E. Neumann, New Jersey, U.S.A. Eng. Pat. 13,948, October 21, 1884.

Petroleum or hydrocarbon liquid is often used as a source of heat in steam generators. The present invention does not require any change in the construction of the ordinary combustion chamber, where solid fuel has been employed. On the usual firegrate is placed a shallow pan of iron with open top, which is kept supplied with petroleum. In front of the tank is placed a series of horizontal jets, supplied with steam by the boiler itself, or from a supplementary source when commencing work. The hydrocarbon is ignited, and by means of the jets of steam the flame is spread, a large quantity of air is caused to rush in from below, and the flame becomes very powerful. —J. T.

Improvements in the Manufacture of Gas. W. L. Reddie, London. Communicated by R. A. Chesebrough, New York. Eng. Pat. 14,200, October 28, 1884.

This invention consists in an improvement in the manufacture of gas, by subjecting bone-black charged with oily or hydro-carbonaceous matter, to a heat sufficient to vapourise the hydro-carbonaceous matter, and convert it into a permanent gas. A vertical retort is employed, provided with a hopper at the top, and a feed roller; inside are sloping shelves, down which the bone-black is supposed to pass gradually to an exit port at the bottom, which leads into a cooler. At the top of the retort is an outlet for the permanent gases formed. A second form of retort is a spiral tube, down which the bone-black is supposed to be capable of passing.—J. T.

Improvements in Self-sealing Mouthpieces and Lids for Retorts, Stills, and Generators employed in the Production of Gas from Coal and other Substances, and for the Distillation of Chemical and other Liquids. S. Adams, London. Eng. Pat. 15,447, November 24, 1884.

This invention consists of a collar or pad forming a seal made of pure asbestos, spun or plaited into square or round cord, the collar being inserted in a dovetail or elongated groove, either in the face of the lid or mouthpiece, as may be required. It is also claimed to cover the core of asbestos with fine metal wire, to protect the fibres from being drawn from the collar by adhering to the lid or mouthpiece when the lid is opened.—D. B.

III.—DESTRUCTIVE DISTILLATION, TAR PRODUCTS, Etc.

Preparation of Pure Thiophene. Victor Meyer. Berichte, 17, 2641.

THE preparation of crude thiophene—that is to say, a mixture of about equal parts of benzene and thiophene—does not offer any difficulties, whereas that of pure thiophene is a laborious operation, and is often accompanied by loss of material.

By limiting the quantity of sulphuric acid used in extracting the thiophene, no benzene is dissolved. The thiophene sulphonic acid, obtained in this way, gives, on distillation, chemically pure thiophene. Should even a portion of the thiophene remain behind in the benzene, the advantage of the method counterbalances any loss from this cause.

These experiments were conducted on the large scale, but the process is not to be recommended for laboratory use. 2000kilos. of pure benzene boiling within half a degree were agitated for six hours, with 100kilos. concentrated sulphuric acid, and the black layer of acid, amounting to 90kilos., separated. 20kilos. of this were converted into the lead salt, and 3·2kilos. of the crude salt obtained gave on distillation with salammoniac chemically pure thiophene. 135grm. thiophene were obtained from every kilogram of lead salt. An analysis of the product indicated the total absence of even traces of benzene. It is important not to add water directly to the black layer of acid, as in this case it completely carbonises on standing. From the author's experiments the following quantities are recommended for obtaining an absolutely pure product: 400kilos. benzene, to be shaken for two hours with 16kilos. sulphuric acid. The black mass is then converted into the lead salt, the lead precipitated with sulphuretted hydrogen, and the acid treated with ammonia to obtain the ammonia salt, and finally distilled.—J. B. C.

Nitrification of Thiophene. Victor Meyer and O. Stadler. Berichte, 17, 2648.

SINCE the discovery of thiophene, attempts have been made to nitrify this substance, and thus to show its analogy with the benzene derivatives. After many unsuccessful efforts, the desired result was obtained by passing a current of air saturated with thiophene through fuming nitric acid. Mononitro-thiophene possesses properties more analogous to paranitro-toluene than to nitro-benzene. It has the characteristic smell of nitro-benzene and nitro-toluene, boils at 224-225° C., and melts at 44°. With fuming nitric acid, it is converted into binitro-thiophene. Binitro-thiophene melts at 52°, and boils at 290°. An isomeric binitro compound may also be obtained from the crude product, crystallising on needles, and melting at 75-76° C.—J. B. C.

Acetothiënone and its Derivatives. A. Peter. Berichte, 17, 2643.

THE method of Friedel and Craft may be employed in the case of thiophene. This has been demonstrated by Comey, who obtained phenylthiënylketone. The author, working in the same direction, prepared the acetyl derivative. To 20grm. crude thiophene (50 per cent.), and 9grm. acetyl chloride, 1·5grm. aluminium chloride are slowly added, quantities of hydrochloric acid being evolved. The yield is not so satisfactory as that obtained by first dissolving the thiophene and acetyl-chloride in petroleum ether, before adding aluminium chloride. Repeated agitation of the mass during the reaction is desirable. When on the addition of aluminium chloride no further evolution of HCl occurs, the reaction is at an end, the petroleum is poured off, the product warmed and poured into water. It separates out as a heavy dark coloured oil. After shaking out with ether, the petroleum previously separated is added. The whole is washed with soda and distilled. After the ether has come over, the heavy liquid is directly distilled, shaken with soda solution and again fractionated. Acetothiënone or methylthiönylketone $C_4H_3S—CO—CH_3$ is a colourless oil, resembling acetophenone in smell, and boiling at 213·5° C. It combines with hydroxylamine, forming thiënylmethylacetoxime, and with phenylhydrazine, a crystalline yellow compound being obtained. By the oxidation of acetothiënones with an alkaline solution of potassium permanganate, an acid having the constitution C_4H_3SCOOH is obtained. Acetothiënone may be nitrified by allowing it to drop into fuming nitric acid cooled to 8°. The product consists of two isomeric mononitro acetothiënones, which may be separated by fractional crystallisation from ether and alcohol.—J. B. C.

Quinoline from Coal-Tar. M. C. Traub and C. Schärges. Berichte, 17, 2618.

ONE of the authors in a former paper prepared a phthalic acid derivative of quinoline, which was shown by Jacobsen and Reimer (Berichte, 16, 2602) to be a quinaldine derivative. The authors have experimented with quinolines from different sources, which did not give this derivative. With a view to discovering the cause of this difference, various reactions were tried. They found that by treating quinoline from coal-tar with phosphorus pentoxide on the water bath, an intense red colouration is produced, and by diluting the product with water or alcohol, the solution gives a beautiful greenish yellow fluorescence little inferior to that of fluoresceine. Neither quinoline prepared by Skraup's method nor quinaldine give analogous reactions. The different fractions from coal-tar give dissimilar results. A distillate under 200° behaves like pure quinoline, that under 230° gives a faint reaction, whereas the portion distilling at 235° produces the most intense fluorescence. Above 235° the reaction is faint. This method of treatment with phosphorus pentoxide is a useful means of rapidly detecting a coal-tar quinoline, and gives reason to believe that in addition to quinoline and quinaldine, a third body is present in this fraction of the coal-tar bases, the isolation of which the authors purpose to attempt.—J. B. C.

Monobromoparaxylene. P. Jannasch. Berichte, 17, 2709.

IN consequence of a paper by O. Jacobsen (Berichte, 17, 2379), stating monobromparaxylene to be a liquid not solidifying in a freezing mixture, contrary to the observations previously made by Fittig and the author, the latter prepared the pure compound from pure paraxylene and bromine in the cold. The product thus obtained boiled at 199-201°, and solidifying in a freezing mixture to a crystalline mass, melting at 9-10°, thus confirming the author's previous observations.—J. B. C.

IV.—COLOURING MATTERS AND DYES.

Method for the Preparation of Naphthylamine Compounds. Dingl. Polyt. Journ. 1884, vol. 254. p. 232.

IN order to replace the hydroxyl group of the naphthyl compounds of the β series by the amido group, a pressure of 30 to 40 atmospheres is necessary in the methods at present adopted. In order to avoid this, L. Landshoff, of Berlin (Ger. Pat. 27,378, January 23, 1883), proposes the following method: The alkaline salts of the β-naphthol sulphonic acids are, at a temperature of 200 to 250°, subjected to the action of gaseous ammonia, the latter being passed over them in a slow current for about 12 hours. The following formulæ explain the reaction which takes place:—

$$C_{10}H_6.OH.SO_3M + NH_3 = C_{10}H_6.NH_2SO_3M + H_2O, \text{ or}$$
$$C_{10}H_5.OH.(SO_3M)_2 + NH_3 = C_{10}H_5.NH_2(SO_3M)_2 + H_2O, \text{ or}$$
$$C_{10}H_4.OH.(SO_3M)_3 + NH_3 = C_{10}H_4.NH_2(SO_3M)_3 + H_2O.$$

This method is applicable to all known sulphonic acids of β-naphthol. The alkaline salts of the β-naphthylamine sulphonic acids thus obtained, when converted into the diazo-compounds, and combined with amines, phenols, oxyphenols, naphthols, or their ethers and sulphonic acids in the well-known manner, form colouring matters varying in the phenol series from yellow to orange and brown, in the α-naphthol series from red to bluish violet, and in the β-naphthol series from yellow orange to red orange. —F. M.

On the Preparation of Isatin. Dingl. Polyt. Journ. 1884, vol. 254, p. 232.

According to a patent (No. 27,979, December 22, 1883) taken out by F. Bayer and Co., of Elberfeld, the direct melting together of dichloracetic acid and analogous compounds, with amines of the aromatic group, is only to be recommended in case of the less reactive amines. When the more reactive amines, such as aniline, toluidine, phenylenediamine, etc., are used, the reaction, even on the water-bath, proceeds so violently, that valueless resinous products are chiefly obtained. In such cases the reaction should be made to take place in solution, alcohol, benzene, etc., being used as solvents. In order to increase the yield of isatin which, when the product of the reaction is worked up directly, is only small, the latter is previously subjected to a process of oxidation. This may be accomplished by passing a current of air through the solution of the product, or by keeping it exposed to the atmosphere, whereby crystals or crystalline masses of almost pure imesatin separate out. This body, which forms the intermediate product in the preparation of isatin, has been found, by careful researches, not to be the original chief constituent of the product of the reaction, ;but to be formed by the spontaneous oxidation which takes place during the reaction and the purifying process in a more or less imperfect degree. Imesatin and its substitution products are, therefore, obtained in larger quantities by more complete oxidation, as in the manner above described. Instead of the derivatives of the disubstituted acetic acids, the amides and aldehydes, also their alkaline salts and ethers, may be employed.—F. M.

On Malachite Green. Dingl. Polyt. Journ. 1884, vol. 254, p. 316. (Ger. Pat. 27,275, September 15, 1883. Dittler and Co., Griesheim, near Frankfort-on-the-Maine.)

By adding chloride of lime to an acidulated aqueous solution of a salt of malachite green, bluish-green colouring matters are formed. 25kilos. of the oxalate of tetramethyl-diamidotriphenyl-carbinol are dissolved in 1000 litres of cold water, and acidulated with 50kilos. of acetic acid. To the solution 7kilos. of chloride of lime are quickly added under stirring, the whole being allowed to stand for half an hour. From the filtered liquor the colouring matter is separated by the addition of ammonia, dissolved in hydrochloric acid, and precipitated again with common salt. By using a larger quantity of chloride of lime (20kilos.) a colouring matter of a bluer tinge is obtained. An analogous product is formed by employing a solution of bromine in caustic soda instead of chloride of lime. To a solution of 53kilos. of malachite green (oxalate) in 2000 litres of water, 100kilos. of hydrochloric acid, and then 18kilos. of bromine dissolved in caustic soda, are added, the colouring matter being immediately afterwards precipitated by means of ammonia. The colour base thus obtained forms a bronze coloured mass; its salts dye bluish green shades. By increasing the quantity of bromine used the shade becomes bluer, as in the previous process. The salts of tetraethyl-diamido-triphenyl-carbinol behave in a similar manner, but yield more yellow shades.—F. M.

Method for the Manufacture of Dinitrophenol Sulphonic Acid. Dingl. Polyt. Journ. 1884, vol. 254, p. 356. (Ger. Pat. 27,271, June 8, 1883. Beyer and Kegel, Lindenau-Leipzig.)

By boiling potassium mononitro-phenol-parasulphonate (obtained from potassium phenol-parasulphonate) with dilute nitric acid, until no more gases are given off, a salt is obtained which in acid solution possesses a yellow colour. The same colouring matter is obtained by boiling potassium phenol-parasulphonate with nitric acid in excess:

$$C_6H_4.OH.SO_3.K+2NO_3H=C_6H_2.OH.SO_3K(NO_2)_2+2H_2O$$

The potassium salts of phenol-orthosulphonic acid or mono-nitrophenol-orthosulphonic acid by the same treatment yield an isomeric body dyeing similar shades to the para-compound, but being more soluble in water than the latter. The same colouring matter is obtained from potassium phenol-disulphonate by treatment with moderately dilute nitric acid. Instead of the potassium salts of the phenolsulphonic acids, their sodium, magnesium or calcium salts may be used. The sulphonic acids may either be used single or mixed to obtain the same colouring matters. Instead of boiling with dilute nitric acid, the phenolsulphonic acids or their salts may be treated with strong nitric acid, or a nitric acid mixture in the cold, the reaction being completed by subsequent heating. Diazo-benzene-parasulphonic acid which, on boiling with water, yields phenol-parasulphonic acid, by being heated with dilute nitric acid naturally forms the same body as phenol-parasulphonic acid, and diazo-benzene-disulphonic acid, derived from ordinary aniline disulphonic acid, the same body as phenol-disulphonic acid.—F. M.

Nitro and Amido Derivatives of Metaxylene. E. Grevingk. Berichte, 15, 2422.

By nitrating metaxylene with nitric acid, Fittig obtained a dinitroxylene (m.p. 93° C.). By employing a mixture of sulphuric and nitric acids, the author obtained in addition to the one melting at 93° C., a dinitro compound of melting point 82° C. 100grm. pure metaxylene, 700grm. sulphuric acid 56° Bé., and 300grm. nitric acid 48° Bé., are brought together and surrounded by a freezing mixture, the temperature being maintained between 3 and 6° C. By varying the quantities of nitric and sulphuric acids, a mixed product of the two dinitro bodies is invariably produced, though in different proportions; and an increase in temperature occasions the formation of a trinitro compound. The two dinitroxylenes are best separated by fractional crystallisation, from alcohol or glacial acetic acid, that of m.p. 82° C. being very much more soluble than that of m.p. 93° C. The operation is, however, a very tedious one, repeated recrystallisations being necessary in order to ensure complete separation. Both dinitroxylenes, on treatment with a mixture of H_2SO_4 and HNO_3, give the same trinitroxylene of m.p. 176° C., first prepared by Fittig. If the trinitroxylene of Fittig has the methyl and nitro groups in the positions 1·3:2·4·6, then it follows that the two dinitroxylenes must have the constitutions 1·3:4·6 and 1·3:4·2 respectively.

Metanitroxylidine 1·3·4·2 dinitroxylene m.p. 93° C., gives a nitroxylidine m.p. 123°, crystallising in deep red compact crystals. From the dinitro compound of m.p. 82° C., by reduction with H_2S, in alcoholic ammonia solution, a totally distinct amido body was formed, melting at 78°, and crystallising from petroleum spirit and water, in golden needles, liquids in which the first xylidine is almost insoluble.

Metadiamidometaxylene 1·3·4·6. By reduction of nitroxylidine m.p. 123° C. with stannous chloride and hydrochloric acid, and precipitation of the tin by H_2S, an almost colourless diamine salt is obtained. This gives the free base in the form of a brown mass, from which the pure compound (m.p. 104° C.) can be prepared by sublimation in colourless crystals. It is identical with the base obtained from dinitroxylene m.p. 93° C.; and by nitrification and reduction with the 1·3·4 xylidine of Nölting and Collin. The hydrochloride gives, with sodium nitrite, a Bismarck brown.

Metadiamidometaxylene 1·3·4·2 is prepared by the reduction of nitroxylidine m.p. 78° C., and crystallises in colourless needles m.p. 64°. In this case tin and hydrochloric acid were employed in preference to the chloride, and a modified method of purification was necessary. The colour reactions with sodium nitrite showed that this compound is likewise a meta-diamine.

Triamidometaxylene is prepared from the trinitroxylene m.p. 176°, by reduction, and is purified by sublimation. By diazotising the hydrochlorides of the amines with sodium nitrite, yellowish brown colouring matters are obtained, which impart to silk, in a soap bath, various shades of brown. That from diamine, m.p. 64°, gives a red brown, that of m.p. 104° a yellow brown, and from the triamine a grey olive. With diazobenzenesulphonic acid different colours are formed. Light yellowish red from the first, a deeper shade of the same colour from the second, and a dark red from the triamine. Dyed on silk, the shades from these varied in exactly the contrary order, that from the triamine giving the lightest, that from diamine m.p. 64° the deepest shade. Metaxylidine 1·3·4 gives, on nitrification, at low temperature, two nitroxylidines of m.p. 123° and 78°, identical with the two already described. By eliminating the amido group from the two latter, with ethyl nitrite in a sulphuric acid solution, two nitrometaxylenes are obtained, that from nitroxylidine m.p. 123° C., boiled at 238° C., identical, therefore, with Tawildarow and Harmsen's nitroxylene 1·3·4; the second, from nitroxylidine, m.p. 78° C., gave a nitroxylene of b.p. 225°C., which must possess the constitution 1·3·2. From metanitroxylene, a metaxylidine, 1·3·4, was prepared by reduction, b.p. 215° C., identical with that of Hofmann and Schmitz; and from nitrometaxylene, a xylidine of b.p. 214·5°, and of constitution 1·3·2.

—J. B. C.

Process for the Manufacture of Naphthol-green. Dingl. Polyt. Journ. 254 [4], p. 184.

THE Frankfort aniline dye works of Gans and Co. (Ger. Pat. 28,065, 1884) dissolve 27½kg. of sodium nitroso-β-naphthol-monosulphonate in 100 litres of water, and after cooling, add 20 litres of iron perchloride solution, containing 5kg. Fe_2Cl_6. After allowing to stand at rest for some hours, the iron in excess is removed by the addition of an alkali. The mass is filtered, and the green filtrate evaporated to dryness. To obtain the green dyestuff in a pure state it must be either recrystallised out of dilute alcohol, or precipitated from its alkaline solution with a lead salt; the precipitated lead compound is then decomposed with dilute sulphuric acid. In place of Schaeffer's monosulphonic acid, all other naphtholsulphonic acids may be used, save β-naphthol-α-monosulphonic acid and β-naphthol-γ-disulphonic acid. If iron is replaced by an equivalent quantity of cobalt salt, brown dyestuffs are obtained; nickel yields a yellow dyestuff. All these substances belong to that still little known class of organic compounds containing metals, which dye wool and silk in an acidulated solution. An excess of acid causes the disappearance of the dye, which reappears again on neutralising the excess of acid.—S. H.

Substitution of the Amido Group by Chlorine, Bromine, and Cyanogen in Aromatic Compounds. T. Sandmeyer. Berichte, 17, 2650.

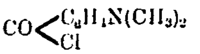
THESE substitution products are obtained by the action of the cuprous compounds of the halogens on the diazo-derivatives. To prepare metachlornitrobenzene from metanitraniline, 4grm. of the latter are dissolved in 7 grm. hydrochloric acid (sp. gr. 1·17), 100grm. water, and 20grm. of ten per cent. cuprous chloride solution added, and the whole heated almost to boiling. From a separating funnel, 2·5grm. of sodium nitrite in 20grm. of water are added, drop by drop. A heavy oil collects at the bottom of the vessel, nitrogen being evolved, and the oil, on cooling, solidifies. A yield of 4grm. metanitrochlorobenzene was obtained of m.p. 45°. By acting upon paratoluidine in a similar manner, and distilling the product of the reaction with steam, parachlortoluene was formed, boiling at 156° to 157°. On adding cuprous chloride to a saturated solution of the hydrochloride of paratoluidine, the author observed the formation of a crystalline double salt, which dissolved on warming. Orthotoluidine, by the same treatment with cuprous chloride, yielded orthochlorotoluene. In this case the yield is small, orthocresol being the chief product. Orthoamidophenol gave orthochlorophenol. From paraphenylenediamine, paradichlorobenzene was prepared; and from metaphenylenediamine the corresponding dichlorobenzene. To obtain bromobenzene from aniline, in place of cuprous chloride, a mixture of crystallised copper sulphate, potassium bromide, sulphuric acid, and copper turnings were employed, and heated until nearly colourless; the aniline added, again heated, and sodium nitrite solution dropped in. In substituting the amido by the cyanogen group, a solution of the cyanide of copper is first prepared by adding potassium cyanide to copper sulphate solution, heating until the first precipitate is redissolved. A solution of diazobenzenechloride is now added slowly, and the mixture distilled; the oily distillate extracted with ether, washed with caustic soda and dilute sulphuric acid and fractionated.—J. B. C.

Improvements in the Preparation of Halogen Derivatives of Tetramethyldiamidobenzophenone and Analogous Ketone Bases. John Henry Johnson. A Communication from Heinrich Caro, chemist to the Badische-Anilin und Soda-Fabrik, Ludwigshafen-on-the-Rhine, Germany. Eng. Pat. 4850, March 13, 1884.

THE ketone bases are treated with trichloride or oxychloride of phosphorus, or the corresponding bromine compounds, when the oxygen of the carbonyl group becomes replaced by Cl or Br. The halogen derivatives thus obtained are unstable blue colours, which readily undergo condensation in the presence of amines, giving rise to triphenyl-methane derivatives, or allied bodies. The following is given as a typical illustration of the process:—Dry powdered tetramethyldiamidobenzophenone is mixed with 1½ times its weight of phosphorus trichloride at the ordinary temperature. The replacement of the oxygen by chlorine is indicated by a spontaneous rise of temperature, and by the mixture becoming blue. During the early stage of the reaction the temperature is not allowed to rise above 40° to 50° C., but after several hours heat may be applied in a water bath to complete the reaction. It is not necessary to actually isolate these unstable blue chlorine substitution products, but the reaction can be performed in the presence of another amine, so as to produce the desired phenyl-methane derivative.—R. M.

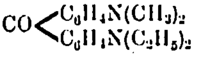
The Production of Violet and Blue Colouring Matters of the Rosaniline Series by Treating Aromatic Amines with Alkylised Amido-Derivatives of Benzoyl Chloride and of Benzophenone. Charles Denton Abel. A Communication from the Farbwerke, vorm. Meister, Lucius und Brüning, Höchst-on-the-Maine, Germany. Eng. Pat. 4961, March 15, 1884.

THE inventors give as an illustration of the process claimed the following series of reactions:—Dimethylamidobenzoic acid (Michler, Ber. ix. 401) is by means of PCl_5 converted into dimethylamidobenzoylchloride—



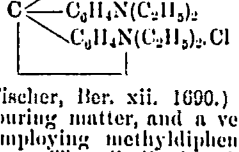
$$CO{<}\begin{matrix}C_6H_4N(CH_3)_2\\Cl\end{matrix}$$

and the latter mixed with an excess of diethylaniline and aluminium chloride and gently heated when a mixed ketone is first formed, having the formula—



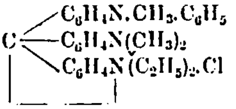
$$CO{<}\begin{matrix}C_6H_4N(CH_3)_2\\C_6H_4N(C_2H_5)_2\end{matrix}$$

This ketone (Michler, Ber. ix. 716), in the presence of aluminium chloride, condenses with a second molecule of diethylaniline, producing dimethyltetrethyltriamidotriphenylmethane:—



$$C\begin{matrix}\diagup C_6H_4N(CH_3)_2\\ -C_6H_4N(C_2H_5)_2\\ \diagdown C_6H_4N(C_2H_5)_2.Cl\end{matrix}$$

(See also O. Fischer, Ber. xii. 1690.) The latter is a blue violet colouring matter, and a very blue shade is obtained by employing methyldiphenylamine instead of diethylaniline. The alkylised amidobenzophenones described can be isolated and condensed with other tertiary aromatic amines by means of aluminium chloride, carbonyl chloride, phosphorus trichloride and pentachloride, anhydrous ferric chloride, zinc chloride, etc. In the presence of sulphuric acid, condensation occurs with secondary amines. Thus the above ketone, with methyldiphenylamine, yields a very blue violet colouring matter of the formula—



$$C\begin{cases} C_6H_4N.CH_3.C_6H_5 \\ C_6H_4N(CH_3)_2 \\ C_6H_4N(C_2H_5)_2.Cl \end{cases}$$

It is of course necessary to isolate the ketones, unless the colouring matter is to contain different radicles. A list of the secondary and tertiary amines, ketones, etc., employed in the syntheses is given in the specification. —R. M.

Improvements in the Manufacture of Colouring Matters of the Rosaniline and Pararosaniline Series. Frank Wirth. A Communication from Emil Erlenmeyer, Frankfort-on-the-Maine, Germany. Eng. Pat. 5021, March 17, 1884.

According to this invention, red, violet, and blue colouring matters of the rosaniline series are produced by oxidising mixtures of methylated amines with primary, secondary and tertiary aromatic amines. Various mixtures of methyl-violet and aniline, or "mineral green," aniline and arsenic acid are also given. The same materials in different proportions can also be oxidised by means of nitro-benzene in the presence of iron filings. The next section of the patent gives processes for the preparation of violet and blue colouring matters by the oxidation of combinations of methylated amines with secondary and tertiary aromatic amines. Thus, for the preparation of colours from dimethylaniline and diphenylamine, the two bases are gently heated with acetic acid, cupric sulphate and common salt for twenty-four hours to 60° to 80° C. with free access of air. Other variations in the process are given, such as the use of a methyl-violet and diphenylamine or benzyl, methyl or ethyldiphenylamine, etc. By heating a mixture of 170 parts diphenylamine, 140 parts methylphenylnitrosamine and 150 parts zinc chloride, or 107 parts monomethylaniline or 60 parts dimethylaniline, 200 parts diphenylnitrosamine and 150 parts zinc chloride to 100° C. for about twelve hours, a blue colouring matter is produced.—R. M.

Improvements in the Manufacture of Violet Colouring Matters. Herbert J. Haddan. Communicated by Dr. Hugo Hassenkamp and the Farbenfabriken vorm. F. Bayer & Co., Elberfeld, Prussia. Eng. Pat. 7645, May 13, 1884.

The object of this invention is to obtain an economical production of sulphonated benzyl violets. Instead of sulphonating the colouring matter directly as heretofore, the leuco-base is acted upon, the ordinary methyl-violet being first reduced and then benzylated; or the benzylated violet is reduced and then sulphonated; the sulpho-acid of the leuco-base being converted into colour by oxidation. The reduction of the violets to the corresponding leuco-bases is effected by means of zinc dust in acetic acid solution, or by any other method; and the leuco-base is benzylated by treating in a closed vessel with benzyl chloride and sodium hydroxide. The benzylated leuco-bases are sulphonated by hot sulphuric acid of 66° Bé., or by cold fuming acid, mono-, di-, or trisulphonic acids being produced according to the number of benzyl groups present. The products are sent into the market as calcium or sodium salts. —R. M.

V.—TEXTILES: COTTON, WOOL, SILK, Etc.

Treating Cotton and Woollen Rags and Fibres. John Illingworth. Amended Specification. Eng. Pat. 2790, June 5, 1883.

The inventor claims the use of a rotary cage, working within a heated flue or boiler, for the purpose of drying fibrous materials that have been previously soaked in dilute sulphuric acid, the object being to disintegrate the vegetable portion. After drying, the speed of the rotary cage is increased, thus causing it to act as a willow. When thoroughly dusted, an alkaline mixture of soda, chalk, or lime is introduced for the purpose of neutralising the acid remaining in the fibre, after which it is again dried. The drying is assisted by means of an exhaust fan.—E. J. B.

Waterproofing Textile and other Fabrics. John Smith Sweet. Eng. Pat. 133, January 1, 1884.

The fabrics are saturated with a composition consisting of linseed oil, soft soap, patent dryers, olive oil, and oil of caraway. They are then exposed to the air or in heated rooms, and finally calendered.—E. J. B.

An Improved Method of and Apparatus for Treating Fibres, Rags, and Woven Fabrics. John Illingworth. Eng. Pat. 493, January 3, 1884.

The object of this invention is to destroy the vegetable portion of mixed rags or fabrics. This is done by means of hot hydrochloric acid gas dried by passing through sulphuric acid. Instead of sulphuric acid, sulphate of chalsium (*sic.*) may be employed. When the action is completed, a fine spray of ammonia solution is introduced for the purpose of neutralising any remaining acid. The operations are conducted in a revolving cage furnished with spikes for the purpose of thoroughly stirring the material. The specification is accompanied by elaborate drawings of the apparatus employed.—E. J. B.

Improvements in the Treatment of Fibrous Materials for the Preservation thereof. Heinrich Wilhelm Knemeyer. Eng. Pat. 3790, February 22, 1884.

The improvements consist in coating yarn or fabric with basic copper or zinc carbonate by alternately soaking in a solution of copper or zinc sulphate and carbonate of soda. The method has this advantage over the old methods of impregnation with copper sulphate or copper or zinc soaps—viz., that the preservative is not so readily removed.—E. J. B.

Improvements in the Treatment of Vegetable Fibres, and of Yarns and Fabrics Manufactured therefrom. Dr. August Prinz and Emil Quellmalz. Eng. Pat. 5838, April 2, 1884.

This invention relates to the treatment of such fibrous substances as nettle fibre, rhea, hemp, flax, and particularly jute. The process consists in macerating the fibre in a cold dilute solution of chloride of lime for 20 to 50 hours. It is then heated under pressure with an alkaline lye containing a proportion of benzene, naphtha, or bisulphide of carbon. The inventors claim that by this process such fibres as the above mentioned can be entirely freed from extraneous substances, and can be rendered fit for weaving into the finest fabrics. —E. J. B.

Improvements in the Manufacture of Waterproof or Impermeable Fabrics. Sydney Pitt. Communicated by the Company for Manufacturing Waterpoof Fabrics, St. Petersburg. Eng. Pat. 10,600, July 25, 1884.

The fabric is first washed in a weak solution of soda, then with water, and afterwards dried. It is then immersed in sulphuric acid of from 54° to 56° Beaumé for 40 to 80 seconds, after which it is rinsed in cold water and placed in a bath of weak ammonia for eight hours. After this preliminary treatment the fabric whilst still wet is soaked in the following solution:—

3000 to 1000 parts of water	526 parts	Colophony
	180 ,,	Soda crystals
	90 ,,	Green soap
	195 ,,	Silicate of potash
	9 ,,	Caustic potash

After remaining in this solution for three hours it is placed for an hour in a bath containing five per cent. of sulphate of alumina, after which it is rinsed and dried. Finally, the fabric is subjected to the action of rotating brushes covered with a mixture of paraffin, wax, and colophony. With the exception of the sulphuric acid treatment, the above process can be applied to woollen goods.—E. J. B.

The Disintegration of Vegetable Tissues. John Adams Southmayd. Complete Specification. Eng. Pat. 11,877, September 2, 1884.

THIS invention consists in a method of reducing vegetable substances to the state of pulp by first boiling with an alkaline lye and then suddenly ejecting the mass under the existing steam pressure of 75lb. to 150lb. The inventor claims a considerable saving of chemicals. By first washing with water, and then introducing a solution of chlorine in water, the pulp may be bleached in the boiler. The mass of white pulp may then be ejected as above. The boiler, which is of a peculiar construction, is conical in shape. A drawing accompanies the specification.—E. J. B.

VI.—DYEING, CALICO PRINTING, PAPER STAINING, AND BLEACHING.

On the Action of Bisulphites upon Chlorates. Dingl. Polyt. Journ. 1884, 254, 226.

SOME observations on the reducing action of sulphurous acid and its acid salts are published by M. Prud'homme in the Bulletin de Mulhouse, 1884, p. 436. Free sulphurous acid yields with chloric acid, sulphuric and hydrochloric acids, whilst the alkaline bisulphites reduce chlorates only partially, as represented in the following equations: $NaClO_3 + NaHSO_3 = HClO_2 + Na_2SO_4$ and $NaClO_3 + 2NaHSO_3 = HClO + Na_2SO_4 + NaHSO_4$. The sodium bisulphate formed in the latter reaction may again act upon the bisulphite and set sulphurous acid free, which in its turn will exert a reducing action. By pouring a 30° sodium bisulphite solution into a concentrated solution of sodium chlorate (about 100 grammes to the litre) a violent reaction takes place, especially when the chlorate solution is warm. A strong odour of chlorine oxidation products and sulphurous acid is developed while the reaction is going on. The solution decolourises indigo and other colouring matters, and converts cellulose into oxycellulose, which can readily be recognised by its affinity for methylene blue, etc. When mixed with aniline salts it forms aniline black, proving the correctness of Rosenstiehl's theory of the formation of aniline black by various oxidation products of chlorine. When chlorates and bisulphites act upon each other in the presence of alcohol, among other products chlorinated ethers are formed.—F. M.

Aniline Black. L. Liechti and W. Suida. Dingl. Polyt. Journ. 254 [6], 265, 1884.

TAKING advantage of the inter-molecular change which chlorate of aniline suffers when exposed to the atmosphere in the crystalline state, the authors have prepared aniline black without the aid of a metallic salt. The aniline chlorate was prepared by adding moist, recently precipitated aniline sulphate to a saturated solution of barium chlorate, and after some time decanting the clear neutral solution from precipitated barium sulphate. The solution of chlorate of aniline yields after a time, colourless prisms of that salt, which by contact with atmospheric air are directly converted into aniline black ("Emeraldine"). The application of heat causes the change to be of an explosive nature. No alteration of crystalline form takes place, the crystals of aniline chlorate simply become bluish black. The authors have studied the behaviour of the pure aniline chlorate solution under varying circumstances, and find: (1) That it can be boiled without change; (2) that the addition of hydrochloric acid with subsequent heating brings about a copious formation of emeraldine; (3) that dilute sulphuric acid causes the precipitation of very little emeraldine; (4) ferric chloride and (5) vanadium chloride act like hydrochloric acid; (6) the solution warmed with cupric sulphate, simply becomes brown; (7) tartaric and acetic acids are without action; (8) warming with dilute nitric acid effects little alteration of the solution, but on the subsequent addition of ferric chloride there is thrown down a precipitate of blue passing to green colour; (9) dilute chromic acid mixture brings about a copious formation of black; (10) the solution boiled with ammonium chloride remains unaltered but subsequent addition of cupric sulphate causes a black precipitation; (11) boiled with ammonium vanadate, the solution does not yield emeraldine; (12) hydrochloric acid in the cold causes the precipitation of emeraldine from a brown solution, which if warmed becomes reddish voilet and yields more emeraldine. The crystals of aniline black yield, after treatment with hydrochloric acid, alcohol, ether and dilute potash solution, pure emeraldine carresponding in its properties with the aniline black described by Nietzki and giving on analysis, numbers which lead to the formula $C_{18}H_{15}N_3HCl$. The authors found the more abundant products of the distillation of emeraldine with zinc dust to be diphenylphenylenediamine, diphenylamine, diamidodiphenylamine, the less abundant, phenylenediamine, aniline and ammonia. The correctness of Nietzki's view *that the black is to be regarded as a* hydrochloride of the base $C_{18}H_{15}N_3$ does not receive confirmation at the authors' hands. They have found that chlorine is present in all the salts derived from emeraldine and *that this chlorine cannot be eliminated* by the action of oxide of silver. They therefore incline to the view that emeraldine is a chloro-substitution product of the base $C_{18}H_{15}N_2$. The correctness of this view derives confimation from the facts that the chlorates of the heavy metals yield oxides of chlorine when decomposed, and of such, Cl_2O_3 for example is capable of forming chlorinated derivatives of organic bodies. To obtain some explanation as to the formation of aniline black upon the fibre and the part played in the reaction by the usually added metallic compounds the authors made the following experiments. Dissolved aniline chlorate was mixed with dissolved aniline hydrochloride in molecular proportions respectively of 1 : 0, 1 : 1, and 1 : 2. The fabric was padded in these solutions, experiments being made at the same time with similar solutions containing a trace of vanadium chloride. On hanging at from 31° to 35° the fabric containing vanadium rapidly blackened, that free from vanadium underwent no change. On treating the latter with dilute hydrochloric acid, a formation of emeraldine soon took place. Also on heating the vanadium free fabric to about 80° to 90°, a formation of black took place even upon the portions not heated. It would thus appear that for the formation of the black upon the fibre, the chloric acid must be in a liberated condition. The metals employed in the production of aniline black are, according to Rosenstiehl, those the chlorates of which are easily decomposed at comparatively low temperatures; hence it has been considered that these simply act by supplying lower oxides of chlorine. Liechti and Suida consider that the presence of free hydrochloric acid is essential to the reaction. If a colour containing aniline hydrochloride, potassium chlorate and cupric chloride be taken, the two latter bodies are mutually decomposed. The chlorate of copper reacts with the *aniline salt as may* be expressed by the equation:

$$(I.)\ 6C_6H_5NH_2.HCl + CuCl_2O_6 = 2C_{18}H_{16}ClN_3 + 4HCl + CuCl_2 + 6H_2O.$$

The hydrochloric acid thus set free, is able in the presence of potassium chlorate to continue the oxidation which the salt of vanadium or copper started, thus:

$$(II.)\ 3C_6H_5NH_2.HCl + KClO_3 + HCl = KCl + 3HCl + 3H_2O + C_{18}H_{16}ClN_3.$$

A small amount of copper or vanadium is therefore able to bring about the formation of a comparatively large quantity of the black. From equation II. it would appear that a portion of the aniline employed might be combined with a feeble acid, in order to decrease to some extent the tendering action of the hydrochloric acid upon the fibre.—W. D. B.

Iron Mordants in Silk Dyeing. Dingl. Polyt. Journ. 254, 437.

THE iron (ferric or "red") mordants used in silk dyeing are prepared by oxidising ferrous sulphate by means of nitric acid. The product is usually a basic ferric sulphate containing a certain small proportion of ferrous salt, and sometimes some nitric acid. The influence of these occasional constituents has been investigated by L. Liechti and W. Suida (Mitth. Techn. Gew., Wien, 1884, 55).. These authors prepared mordants of the following typical composition respectively :—(1) $Fe_2(SO_4)_{2\cdot5}OH$ of 30° B. ; (2) $Fe_2(SO_4)_2NO_3.OH$ of 30·5° B. ; and (3) $Fe_2(SO_4)_2(OH)_2$ of 31° B. Weighed quantities of silk were allowed to lie in these solutions under the usual conditions, and after further treatment by the ordinary method the quantity of iron fixed in the fibre was determined. The most favourable result obtained was with (3), 12 per cent. of Fe_2O_3 being fixed, whereas from (1) only 8 per cent. was taken up by the silk. The weight from (2) was 11 per cent., a result very little inferior to that obtained with (3), notwithstanding that the latter was the more basic. Most of the commercial products examined by the authors approximated in composition to (1), but contained also a small but varying proportion of nitric acid. One of the standard products used at Crefeld had the following composition :—Total iron=11·5 per cent., as ferrous salt 0·5 per cent., sulphuric acid (SO_4)=27·2 per cent., corresponding to the formula $Fe_2(SO_4)_2$. With respect to the influence of ferrous salt upon the dissociation phenomena of the mordant the authors find that in regard to the dissociation produced by water alone it is considerably less in presence of ferrous salt, whereas, strange to say, the dissociation caused by the silk fibre is not in any way affected. The question therefore of the employment of mordants containing residual ferrous salt is still an open one.—C. F. C.

Potassio-Antimony Oxalate as Tartar Emetic Substitute. Dingl. Polyt. Journ. 255 [3], 122.

FOR fibres of vegetable origin tannin has always been employed as the most efficacious mordant for artificial colouring matters. As a type of the kind of mixings to be employed as a means of conveying aniline colouring matters on to cotton fabrics we have always had a suitably thickened mixture of colouring matter (salt of rosaniline or substituted rosaniline) with tannic acid and acetic acid added to avoid premature precipitation. Such lakes were, however, soon found to be of very limited fastness, to lose considerable quantities of colour not only on soaping, but even on mere washing and steaming. The consequence was loss, and what was still worse, degradation of the whites and of the colours printed along with the above. It was impossible—*e.g.*, to employ an alizarine steam red together with methylene blue fixed only with tannin. The idea developed then to fix the tannin not only by a colouring matter, but also by a metallic oxide, and Thomas Brooks, of Manchester, made the proposal to accomplish this end by means of antimony, and to apply the same as tartar emetic. This salt was chosen on account of being dissolved by water *in toto*—*i.e.*, without the formation of insoluble compounds, and also because whilst fixing the tannates it exercises no further and degrading action on the other colours. The Société Industrielle de Mulhouse in 1881 awarded a medal to Mr. Thos. Brooks for his successful improvement. An objection was the cost, the said salt being one of the dearest antimonial preparations. Moreover, tartar-emetic cannot be replaced by such antimony salt as the trichloride since the same yields with water an insoluble basic salt and free acid. Of the attempts made to substitute cheaper metallic salts for tartar-emetic, H. Schmid's proposal to employ acetate of zinc met with a certain amount of success in practice (Chemiker Zeitung, 1881, p. 949). Acetate of zinc acts well when it is simply the intention to fix the tannin, and is employed in several print works. In the case of more complicated patterns, such as when it is desired to fix aniline colours along with alizarin red, antimony takes the first place, and the introduction into commerce of the cheaper oxalate instead of the tartarate was a step in the right direction. The double oxalate had indeed been known for some time, but was sold at a price out of proportion to its contents in antimony. Tartar emetic contains 43·7 per cent. of Sb_2O_3, and $Sb(C_2O_4K)_3.6(H_2O)$ only 23·67 per cent. Sb_2O_3. Hence in making up an antimonial bath we require double the quantity of the latter salt. At the present time the salt in question is sold at a price proportionate to its percentage of Sb, and to the price of the organic acid contained in the salt. If solutions of the double oxalate be much diluted a slight deposit of insoluble basic salts is observed, but does not appear to cause any disturbance. This property is indeed of use in making printing trials on the small scale. Thorough washing is essential in order to remove any basic salt which might attract fatty acids during the soaping process, and then degrade the whites by means of waste colouring matter.—H. A. R.

Phenylhydrazine as a Discharge on Bistre. Dingl. Polyt. Journ. 255 [3], p. 128.

G. SCHAEFFER, in *Bulletin de Mulhouse*, 1884, p. 57, states that phenylhydrazine, owing to its reducing properties, may be employed in a similar manner to hydroxylamine (see *Bull. de Mulhouse*, 1883, 250, p. 380) to produce white patterns on a ground of manganese or bistre brown.—H. A. R.

Improvements Applicable to the Dyeing of Black Colours upon Cotton and other Vegetable Fibres. Joseph Knowles Kaye. Eng. Pat. 2372, January 30, 1884.

THE material is dyed in a bath containing logwood extract, tannic acid, and carbonate of copper. It is removed from the bath, allowed to stand for a few hours, and then saddened by immersion in a cold weak solution of iron liquor. Such a method gives a finer and more durable black than has hitherto been obtained.—E. J. B.

Improvements in Dyeing Wool or other Similar Animal Fibre, and in Apparatus Employed therein. Charles Holliday and Ernest William Hirst. Eng. Pat. 2837, February 6, 1884.

THE improvement consists in dyeing wool in a chamber of special construction. The dyeing or mordanting solution enters at the bottom of the chamber, and flowing upwards by a central tube is distributed evenly over the material to be dyed, which is placed on a series of perforated plates. The chamber is connected with an air-pump, and is furnished with a steam coil for heating. The inventors claim :—"The method and combination or arrangement of apparatus for dyeing wool and other similar animal fibre, whereby the air or vapour released or generated during the operation is enabled to pass off without passing through the fibres, in order to prevent deleterious effects upon the fibres from ebullition or disturbance thereof, and to obtain better distribution of liquid passing there through." By using such an apparatus a considerable economy of dye is effected, particularly in the case of indigo.—E. J. B.

Manufacture of Mordants and Colouring Matters from Glucosides, Tannin and Bitter Principles. W. L. Wise. A Communication from C. H. Knoop. Eng. Pat. 4480, March 6, 1884.

THIS relates to the production, by the action of oxidising agents, of colouring matters which are soluble in water and precipitated by alkalis, and of which the less highly oxidised may be used as mordants, while the more oxidised give fast colours without the use of separate mordants on spun and woven fabrics, either animal or vegetable. As an example, 20kilos. of extract of Brazilwood are dissolved in boiling water, to which is added a little nitric or hydrochloric to precipitate the

resin, and the clear brazilin solution is removed, and a solution of 5kilos. of permanganate of potash is mixed with it with constant agitation. The resulting precipitate is filtered off, washed and dissolved in nitric, hydrochloric, sulphuric, or oxalic acids, and if necessary boiled. After cooling, it is neutralised with ammonium carbonate, and forms a reddish-violet colouring matter in the form of a paste. Many other chemicals may be substituted for permanganate of potash, with varying results. Tetrachloride of tin, chlorate and chromate of potash, and salts of mercury, chromium arsenic, manganese, etc., and frangulin, maclurin, quercitrin, carthamin, hematin and catechin are spoken of as suitable materials.
—H. R. P.

Improvements in Bleaching Fibrous Materials, Fabrics and Paper-pulp of Vegetable Origin. Robert and Alexander Watson Townsend, of Port Dundas, Glasgow, manufacturing chemists. Eng. Pat. 12,732, September 24, 1884.

The object of this invention is to shorten the time required, obtain improved results as regards whitening action, and avoid injury to the materials operated on when bleaching fibrous material, fabrics or paper-pulp, of vegetable origin. The invention consists in the employment of one or more of the oxychlorides of magnesium, barium, strontium, potassium or sodium. For bleaching jute, esparto, wood-pulp, cane-pulp or other vegetable material, the inventors propose to employ oxychloride of magnesium in solution, and of the strength of about 11° T., and claim that one gallon of the said solution will bleach about five pounds of the materials when these are in the condition in which they are ordinarily subjected to a bleaching process. "The bleaching action will in most cases take place on steeping the materials in the solution at the ordinary temperature for a suitable length of time, but the action may be increased or hastened by raising the temperature." No acid is added to the solution, nor do the materials require to be "soured" or treated with dilute acid. The "improved process effectively, and without injuring the fibre, bleaches jute and other vegetable materials of kinds which cannot be satisfactorily treated by ordinary bleaching without injury to the fibre." The solution is prepared either by dissolving the salt previously prepared in any known way, or else by the double decomposition of bleaching powder solution and the solution of the sulphate of magnesia, or the sulphate of one or more of the bases hereinbefore named.
—H. A. R.

VII.—ACIDS, ALKALIS, AND SALTS.

On the Oxides of Nitrogen. Prof. W. Ramsay and J. Tudor Cundall. Proc. Chem. Soc. [3], 22-23.

In this research it is shown—

1. That the green or blue liquid obtained by the action of arsenious anhydride on nitric acid consists of a mixture of nitrous anhydride and nitric peroxide, in proportions depending on the strength of the nitric acid and the temperature at which the volatile liquid is condensed.

2. That if a dehydrating agent, such as sulphuric acid, be present in sufficient quantity the distillate consists of pure peroxide, and that this process is by far the most convenient one for the preparation of the peroxide.

3. That if oxygen be passed over the blue liquid, the vapours condensed in a freezing mixture are still blue or green; a great excess of oxygen is necessary to effect conversion from nitrous anhydride into peroxide.

4. That when excess of nitric oxide is passed along with the peroxide into a cooled bulb, the trioxide is produced, the amount of trioxide depending on the temperature of the condenser.

5. The vapour-density of a liquid of a deep-blue colour, containing about 30 per cent. of trioxide and 70 per cent. of peroxide, shows that the trioxide cannot exist in the gaseous state, but at once dissociates into nitric oxide and peroxide on changing to gas. The theoretical vapour-density of such a mixture was calculated from a formula deduced from the second law of thermodynamics by I. Willard Gibbs, which shows the relations between temperature, pressure, and vapour-density of the mixture of NO_2 and N_2O_4 in the gaseous peroxide; and it was found that the vapour-densities of a mixture of $(NO_2 + N_2O_4)$, (partly present in the original liquid as peroxide, partly formed by the decomposition of the N_2O_3 present into NO and $(NO_2 + N_2O_4)$), with the NO produced by the decomposition of the N_2O_3, calculated by means of Gibbs' formula, are identical, within limits of experimental error, with those obtained by direct experiment.

6. The presence or absence of moisture does not appear to affect the reaction between NO and O_2.

7. It is probable that N_2O_3 undergoes dissociation with rise of temperature, even while liquid.—W. S.

New Apparatus for the Production of Ammonia Soda. Dingl. Polyt. Journ. 254 (12), p. 488.

The Société Anonyme des Produits Chimiques de l'Est, following the patent of D. Maguin, of Nancy (D.R.P., Kl. 75, No. 28,761, of December 11, 1883), seek to obtain a more complete action of the carbonic acid on the ammoniacal liquors by causing the latter to flow uninterruptedly from a reservoir R (Fig. 1), through a pipe *t*, to fill the series of vessels B, C, etc. to a certain height, the liquor passing from one vessel to the next through the overflow pipes *b*, *c*, *d*, etc., and being at last run off from the last vessel G by opening the cock *h*. At the same time, brine flows into the vessel A from the washing apparatus *w*, which is fed from S, and this absorbs the ammonia from the gases before their escape from the apparatus. This brine mixes in the vessel B with the ammoniacal liquor, and its flow is regulated so as to always form an appropriate percentage of the ammonia contained in the mixture. The carbonic acid is let in with a certain velocity, and, traversing the vessels in a direction opposite to that of the ammonia liquor, passes through the washing apparatus *w*, and escapes through the pipe *n* into the air. Whilst the pure carbonic acid is introduced by the pipe *k*, the impure carbonic acid enters through the pipe K, so that the latter first mixes with the pure gas after this has passed from F into the next vessel E. In every vessel, the gas first passes through an inverted funnel, the larger circumference of which is serrated, and rises up through the liquor, which it dashes about in the upper part filled with gas, and then passes over into the next vessel in the series. For the recovery of the ammonia after the separation of the precipitated sodium bicarbonate, the whole of the free ammonia and carbonic acid is driven off in the vessels A to C (Fig. 2), and the decomposition of the ammonium chloride, by means of lime, is effected in the vessels D and E. While the apparatus is working, the clear liquor flows uninterruptedly through the pipe *t* into the collecting vessel M, then through an overflow pipe *a* to the distilling vessel A, and likewise through *b* and *c* into the stills B and C. The liquid coming over from this last vessel C into the vessel D contains no more carbonate of ammonia, but only ammonium chloride. Milk of lime is therefore constantly pumped into the vessel D through the pipe *s*, and reacts upon the liquor likewise continually flowing in, and sets free ammonia. As soon as the liquor in the vessel D has reached a certain height, a portion is allowed to flow over into E by opening the cock *h*. Both vessels D and E are provided with inverted troughs with toothed edges, in order to favour the disengagement of the ammonia. The steam entering by the pipe *v* at the bottom of E, drives out the last traces of ammonia still in the liquid, and the steam with the ammonia flow through the pipe *e* into the vessel D, where, after becoming considerably enriched with ammonia in passing through the liquor, it then enters by the pipe *f* into the inner funnel *x* of the vessel C, until finally it arrives along with ammonia and carbonic acid by the pipe *z* in the collecting vessel M, and further into the pipes *m*, which are cooled in a trough containing water. The steam becomes for the greater part condensed here, and flows back in the somewhat inclined pipes *m*, into the collecting vessel, from which it reaches the apparatus again through the overflow pipe *a*. The mixture of ammonia and carbonic acid gases, with only a small quantity of water vapour, flows over through the pipe H into the vessels O and P, by the liquor in which it becomes absorbed.—G. H. B.

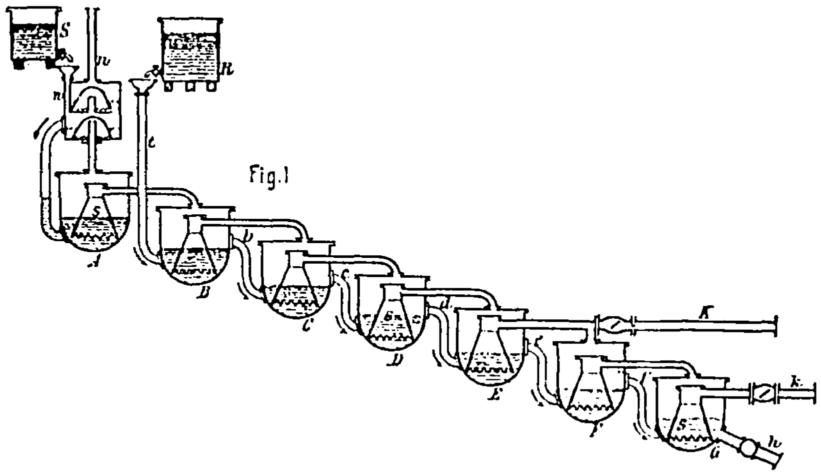


Fig. 1

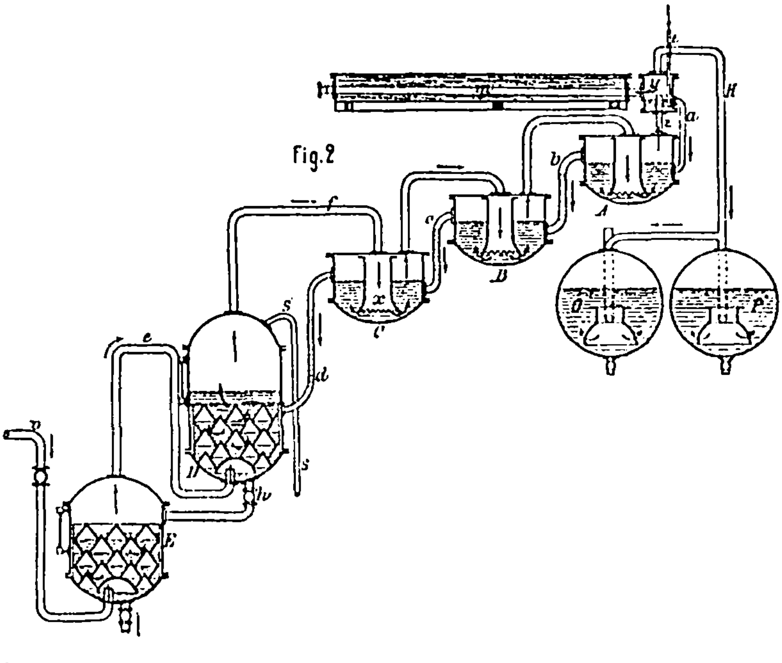


Fig. 2

Process for the Recovery of Sulphur from Soda Waste. Dingl. Polyt. Journ. 255, 206, 1885.

H. GROUVEN (Ger. Pat. 29,848, May 30, 1884) mixes alkali waste with 10 per cent. of sawdust, and from 10 to 25 per cent. of water, according as the waste is new or old, in a kneading machine, and then moulds the resulting doughy mass into tubes, in an ordinary press. The most suitable length for these tubes is 250mm., the external diameter being 45mm., and the internal 20mm. The tubes are exposed to the action of the air, under cover, for about two days, when they become hard and brittle. They are next heated in retorts, along with steam. The carbonic oxide and hydrogen generated throughout the mass, completely reduce all the oxides of sulphur contained in the waste. Almost all the sulphur is converted into the form of sulphide of calcium; and this, at a high temperature in the presence of steam, yields sulphuretted hydrogen and lime. The chief object in using sawdust is to give great porosity to the moulded cylinders, this being essential to the complete decomposition of the mass. When the proper temperature has been maintained, practically, all the sulphur is removed in three hours; and the residue left in the retorts is yellow coloured, and on boiling with dilute hydrochloric acid, neither carbonic acid, nor sulphuretted hydrogen, nor sulphurous acid, is evolved. On fusing with nitrate of potash, only from one to two per cent. of sulphuric acid is obtained, and this existed principally as sulphate of lime. This residue contains from 85 to 90 per cent. of quicklime, and can be used for mortar making.—W. M.

Leplay's Process for Preparation of Barium and Strontium Hydrates. Dingl. Polyt. Journ. 254, 430.

THIS process (Ger. Pat. 28,757, 1883), consists essentially in treating the carbonates with steam superheated to a temperature higher than the melting point of the hydrates. The details are as follows:—The carbonate is introduced into the iron pots E (Fig. 1), which, having been brought to a low red heat, are successively removed, and their contents transferred to the retort A. Superheated steam is then introduced into A, through *d*; the carbonate is decomposed, and the molten hydrate flows by way of *n* into B. *t* is a tube containing barium or strontium hydrate, by the melting of which the attainment of the requisite temperature, by the steam issuing through *d*, is ascertained. The molten hydrate is run off from B, through S, into iron moulds. A supplementary patent (29,153, 1884), contains modifications and improvements in detail. It is found that the carbonates are best prepared by working them into a paste with 30 to 40 per cent. of a weak caustic lye—the presence of the alkaline hydrate facilitates the separation of the molten earth-hydrate from the undecomposed carbonate—which is then made into balls or hollow cylinders, which require to be suddenly heated to a high temperature in order that they may not fall to pieces with the loss of water.—C. F. C.

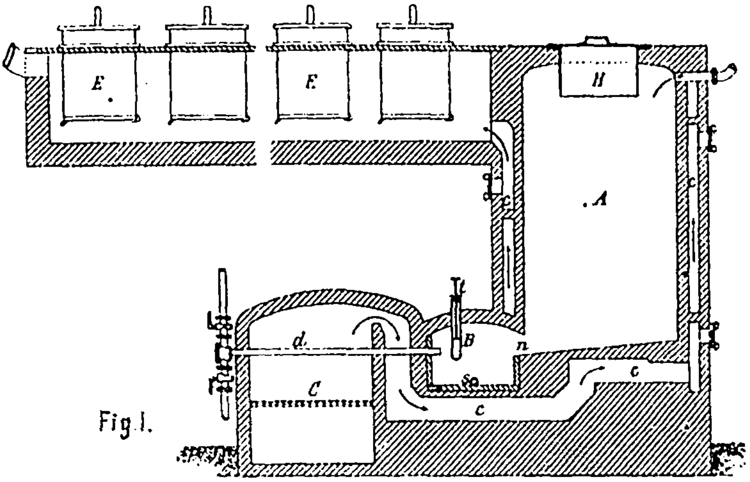
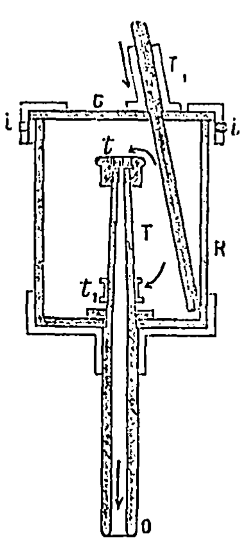


Fig. 1.

Apparatus for the Preparation of Solid Carbonic Acid. Dingl. Polyt. Journ. 255, 201, 1885.

For the solidification of carbonic acid, Ducretet (*Comptes Rendus*, 99, 235, 1884) employs an ebonite cylinder R, the cover of which can be fixed by the clamps S. The pipe T passes through the cover and reaches almost to the bottom of the vessel. The liquid carbonic acid enters by this pipe, and solidifies as it strikes against the bottom of the cylinder; while the gaseous carbonic acid, and any air which has been carried over escape by the pipe *o*, the openings of which, at *t* and *t*, are covered with fine wire gauze. The top G is taken off when it is desired to remove the solid carbonic acid. This apparatus is said to produce a much larger quantity than Thilorier's system.—W. M.



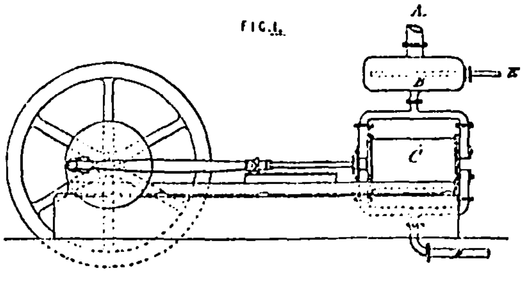
Preparation of Sulphuric Acid from Gypsum. Dingl. Polyt. Journ. 255 [2], 87.

By heating a mixture of two parts of calcium sulphate with one of ferric oxide, to a bright red heat, *Scheurer Kestner* obtains all the sulphur as sulphuric anhydride. Towards the end of the process, sulphurous acid and oxygen are formed, but this decomposition is considerably retarded by adding either calcium fluoride or chloride to the mixture. A similar reaction takes place at a lower temperature with the sulphates of other bibasic metals, such as lead or magnesium.—S. R.

Improvements in the Method of and Apparatus for Manufacturing Sulphuric Acid. M. Finch, W. J. & S. Willoughby, Plymouth. Eng. Pat. 3086, February 11, 1884.

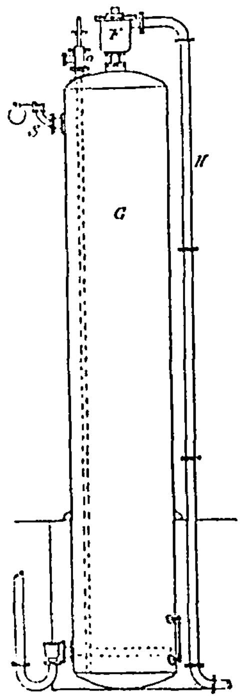
The sulphurous and nitrous gases from the pyrites or sulphur burners, after passing through a Glover tower, are conducted into a pump, or any other contrivance suitable for drawing and forcing the same. Before entering the barrel C (Fig. 1) of the pump, they are made to pass through the enlargement B, where they are subjected to the action of a spray of steam, water or acid, until they become saturated. They are then forced through the pipe D into a tank or tower G (Fig. 2), wherein they are compressed to promote the oxidation of the sulphurous gas. Sulphuric acid is formed, which falls to the bottom, whence it is drawn off by a valve O. The tower is provided at the top with a valve F, so constructed, that when the gases attain a certain pressure, the uncondensed

FIG. 1.



portion thereof may escape through the same, and pass into another tower of similar construction; and this is repeated until the desired conversion into sulphuric acid has been effected. From the last tower, the gases, deprived of sulphurous acid, escape into a Gay-Lussac column for the absorption of nitrous gases.—S. H.

FIG. 2.



Improvements in the Manufacture of Soda and Chlorine. Charles Wigg, Liverpool, and John Waller Pratt, Runcorn. Eng. Pat. 3673, February 21, 1884.

The object of this invention is to treat the residual ammonium chloride liquors of the ammonia soda process in such a manner as to obtain, not only all ammonia, but also all the chlorine, in a condition suitable for the manufacture of more soda, and of bleaching powder. For this purpose the ammonium chloride solution is boiled in a closed boiler, until all the free ammonia and ammonium carbonate which it contains has been volatilised. It is then evaporated, either to complete dryness, or until crystals of ammonium chloride and sodium chloride separate out. The latter can be removed, if found detrimental. The solid ammonium chloride is then mixed with finely ground calcium carbonate, in equivalent proportion. The mixture is transferred to a hemispherical pan, heated from beneath, and provided with a tight-fitting, cast-iron hood or dome, resting on its upper rim. On heat being applied, sesquicarbonate of ammonia is volatilised and sublimed to the roof or dome of the pan, to which it adheres. If the dome is maintained at a high temperature, the condensation of the ammonia salt is prevented, and it can be directly passed into brine for the manufacture of soda ash. The residue in the pan consists of a loose, porous mass of calcium chloride, and while it remains hot in the pan, the top of the pan containing the sublimed ammonium carbonate, is removed, and replaced by another tight-fitting cover, provided with an escape pipe, leading to a condenser. Oil of vitriol is then run on to the contents of the pan, whereby hydrochloric acid is produced; whereas, the calcium sulphate, thus formed, is roasted and converted into plaster of Paris. The sublimed ammonium carbonate is dissolved in strong brine, and another molecule of carbonic acid passed into that solution, causing the formation of sodium bicarbonate, thus:—

$$(NH_4)_2CO_3 + H_2O + CO_2 + 2NaCl = 2NaHCO_3 + 2NH_4Cl.$$

The ammonium chloride solution re-enters the cycle of the operations. By using calcium carbonate, the expense for generating and pumping one-half of the total carbonic acid needed for the production of carbonate of soda, is saved. Instead of using calcium carbonate for the decomposition of ammonium chloride, the carbonates of magnesia, baryta and strontia may be also employed. If magnesium carbonate be used, magnesium sulphate—Epsom salts—will be the ultimate product. Barium or strontium carbonate will leave the chlorides of these metals, as residues, in the pan. In place of running oil of vitriol on the chlorides, the latter are dissolved in hot water, filtered and precipitated with sulphuric acid, yielding precipitate of barium or strontium sulphate, and a supernatant solution of hydrochloric acid. The barium sulphate prepared in this way is as "blanc fixe," an article of considerable commercial value, while strontium sulphate is also suitable for many technical applications.
—S. H.

Improvements in the Manufacture and Storage of Bichromate of Soda. C. S. Gorman, Ayrshire. Eng. Pat. 4195, March 1, 1884.

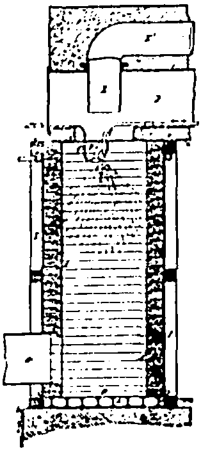
250 Parts chrome iron ore, 150 chloride of sodium, and 250 hydrated lime, are mixed and furnaced in presence of superheated steam, at a temperature of 1000° to 1600° F. Hydrochloric acid is evolved and condensed, and chromate of soda is formed, which is dissolved in water, the solution evaporated down and treated with sulphuric acid, to form bichromate of soda. The liquid is then allowed to cool, when sodium chloride and sulphate separate out. The solution of bichromate of soda is further evaporated by hot air, and run in the fluid state into metallic drums, or the evaporation may be carried to dryness.—G. H. B.

Improvements in the Manufacture of Chromates and Bichromates. W. J. A. Donald, Glasgow. Eng. Pat. 6731, March 13, 1884.

This patent aims at the production of ammonium chromate and bichromate. Chromate of soda, obtained preferably, as described in another patent by the same author, is dissolved and treated with ammonium chloride; sodium chloride is separated by evaporation; and bichromate of ammonia is formed by the addition of a suitable acid, and is obtained in the solid state by evaporation.
—G. H. B.

Improvements in the Evaporation and Concentration of Liquids. H. E. Newton, London. Communicated by A. Nobel, Paris. Eng. Pat. 5383, March 24, 1884.

The object of this invention is to provide a rapid method for the evaporation and concentration of liquids. To effect this the liquid is forced in the form of spray into the interior of a tall cylindrical vessel or tower, and at the same time subjected to the action of a current of hot air. The concentrated liquid settles in the lower part of the tower, and can be drawn off at intervals; that portion which is carried over with the air, and the water evaporated, is condensed in suitable vessels. The construction of the apparatus depends in a great measure upon the material operated upon. The illustration shows a form of apparatus suitable for acting upon sulphuric acid. A is a cylindrical tower constructed of lead and lined with a non-corrosive body; it is water jacketed round the exterior I, and on the bottom II. F is an injector formed by the pipe *f'* conveying the acid, placed at right angles to the pipe *f*, which admits a blast of hot air at a suitable pressure; the quantity of acid is of course regulated according to the requirements of the evaporation. E is the pipe for conveying the hot air required for the concentration, the temperature of the air being in this case about 500° C. G is the pipe conveying away the air charged with water and acid vapour, which may be cooled down to a convenient temperature, and then sent through the leaden chambers; *b* is the pipe which carries off the strong acid after concentration. The lower part of the tower may be advantageously packed with non-corrosive material such as pumice stone, etc. D is a pipe which brings the sulphurous acid gas from the pyrites burners on its way to the acid chambers, and thus the heat of this is utilized for the purpose of concentration.



The claims are (1), the concentration of sulphuric acid and other liquids by injecting them into a tower as described, and passing through the spray a current of heated air; (2) the utilisation of the heat of the gases from the pyrites or brimstone kilns, alone or in conjunction with air, for concentrating the spray of sulphuric acid, as described and set forth.—C. C. H.

Improvements in the Manufacture of Sulphate of Ammonia. W. A. Meadows, Lancashire. Eng. Pat. 5520, March 27, 1884.

THE absorption of ammonia by dilute sulphuric acid is carried on at a temperature not lower than 100° F. in presence of a small quantity of tar, pitch, oil, fat or like substance, which collects a scum containing the arsenic and iron of the sulphuric acid, and facilitates the removal of these impurities. Pure white crystals of sulphate of ammonia crystallise out.—C. H. B.

Improvements in the Manufacture of Chlorate of Potash. J. Wilson, Berwick-on-Tweed. Eng. Pat. 5975, April 5, 1884.

POTASSIUM chloride and magnesia in suitable proportions are mixed with water and run through a series of vessels where saturation with chlorine is effected. Chlorate of potash crystallises out on evaporation of the resulting solution, and the mother-liquor containing magnesium chloride and some chlorate of potash is further evaporated and roasted in a muffle furnace, whereby chlorine, hydrochloric acid and magnesia are obtained.—C. H. B.

Improvements in Purifying Sulphuric Acid. W. P. Thompson, Liverpool. Communicated by G. Thomson, Quebec, and W. Kemp, Jarrow-on-Tyne. Eng. Pat. 6215, April 10, 1884.

CHAMBER acid is treated with ammonium sulphide, which precipitates the arsenic and antimony present. The acid is then rendered clear by filtration through finely divided lead, and is further concentrated by evaporation, during which the ammonium sulphate present assists in the expulsion of the last traces of oxides of nitrogen, and a very pure acid is the result.—C. H. B.

Improvements in Furnaces for the Manufacture of Sulphate of Soda, or Hydrochloric Acid, or for Roasting, or Calcining Ores, or for Analogous Purposes. W. Black and Thos. Larkin, South Shields. Eng. Pat. 4718, July 16, 1884.

THE substances under treatment are contained in a box-chamber, the cover and bed of which are formed of fire-clay quarls or cast-iron plates. This chamber is provided with a mechanical stirrer, the shaft of which is suitably protected from the fire. Fire-places are arranged on opposite sides of the chamber so that the heated gases from them pass both above and below the said chamber, and thence to the main flue. The charge may be introduced by a suitable channel leading from a decomposing furnace or otherwise, while it is removed by specially constructed doors. A flue leading from some convenient part of the chamber allows of the escape of the evolved gases, which thus never come into contact with the products of combustion coming from the fire-places.
—A. R. D.

Improvements in the Production of Alkali Carbonates, and in Apparatus therefor. Peter Jensen, London. A Communication from Adolph Vogt and August Figge, Westerhausen, near Madgeburg. Eng. Pat. 13,590, October 14, 1884.

CHLORIDE of potash or soda and finely divided gypsum or sulphate of magnesia are intimately mixed with caustic magnesia, kneaded moist, and dried. The resulting porous mass is broken into pieces and charged into the sulphating furnace, which consists of a series of superposed cast-iron pipes, so set in brickwork that as little as possible of the weight of each pipe falls on the pipe next below. Superheated steam is driven through the charge, which causes the chlorine to pass away as hydrochloric acid, and the sulphuric acid to combine with the potash. The resulting mixture is transferred to another vertical cast-iron retort raised to redness by external heat, and treated with pre-heated carbonic oxide gas, the sulphate being thus reduced to sulphide. When the reduction is complete, the temperature is allowed to fall, and a mixture of carbonic acid and steam passed through the retort. The sulphide is now converted into carbonate, and the sulphur passes away as sulphuretted hydrogen. The resulting mass is lixiviated cold for the extraction of the carbonates. If a mixture of air and steam instead of steam only is driven through the sulphating retorts, chlorine comes off instead of hydrochloric acid. In this case the inner surface of the retort must be protected by a coating of silicious enamel.—A. R. D.

Improvements in the Process of Manufacturing Permanganates. Theodor Kemp. Eng. Pat. 8218, October 22, 1884.

THIS is a process for the transformation of manganates into permanganates by an electric current. The negative electrode is placed in water and the positive in a solution of the manganate in question, the two being separated by a porous wall. The electric current causes the permanganate to separate in the cell containing the positive electrode, while the corresponding hydroxide is formed and hydrogen evolved in the other cell.—A. R. D.

Improvements in and Relating to the Manufacture of Chlorine. Walter Weldon, Burstow, Surrey. Eng. Pat. 9305, June 23, 1884.

THIS invention relates to the apparatus employed in the manufacture of chlorine from a chloride of a metal or mixtures of chlorides, by heating them in a current of air, at the same time excluding the products of combustion of fuel. The operation is performed in a regenerative furnace represented in vertical section by Fig. 1; Fig 2 shows a section across the line CD, and Fig. 3, a section across the line AB. A, A^1, A^2 and A^3 are four vertical brick chambers of a small diameter, but with very thick walls. They communicate with each other at their upper and at their lower extremities, whereas the end chambers A and A³ are in direct communication with the regenerators RR. The pipes M and M¹ serve alternately as outlet pipes for the gas given off in order that the current of air may be reversed at will. The whole furnace is encased by iron plates, and protected as much as possible from loss of heat. In using the apparatus, the first step is to heat up the four chambers A, A¹, A² and A³. To this end, gaseous fuel is admitted by one and air to burn it by the other of the two divisions of one set of regenerators RR. The pipes M and M¹, the discharging doors *c*, the covers B and the sight-holes *d* being all closed, products of combustion then traverse each of the four chambers successively, and finally pass off by the other set of regenerators, from which they are conducted to a chimney. In order to heat the furnace uniformly, the course of the fire-gases is reversed more or less frequently. When the masses of brickwork of the four chambers have absorbed sufficient heat, the admission of fire-gases is suspended, and the chambers are charged by the openings at B with the substance from which chlorine is to be evolved. One of the pipes M and M¹ is then opened, and the regenerator on the same side of the apparatus closed, and air only admitted by the other regenerator. The substance will take up heat from the brickwork, and a current of air, which has been previously heated during its passage through the regenerator, will pass over and through the contents of the four chambers, and there will pass off a mixture of gases containing free chlorine. When the charge in A, A¹, etc., has been sufficiently decomposed, the residual solid product is discharged by the doors *c*, and after closing these, as well as the pipes M and M¹ and the *sight-holes d*, the apparatus will be ready to be heated up again for another operation. The products of combustion after having been employed to heat up an apparatus according to this invention should be applied for evaporative purposes, since the chlorides from which the free chlorine is to be evolved will be first obtained in aqueous solution, which solution will require to be evaporated to dryness before being subjected *to the action of heat and air in the* chambers.—S. H.

FIG. 1.

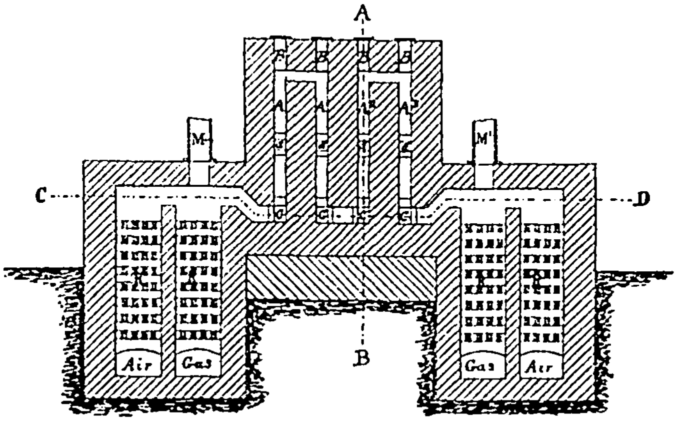


FIG. 2.

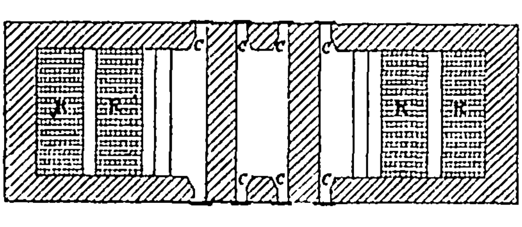
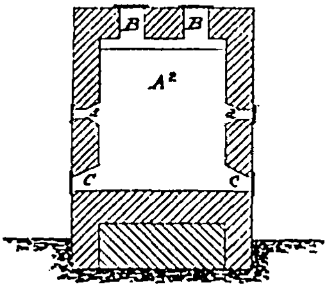


FIG. 3.



Improvements in the Method of and Apparatus for Treating Bisulphate of Soda for Industrial Purposes. Frank Wirth, Frankfort-on-Maine. A Communication from Hermann Herberts, Barmen, Germany. Eng. Pat. 3323, November 10, 1884.

Two cisterns containing respectively a concentrated solution of bisulphate of soda, and chalk suspended in water, communicate with a lead-lined, boiler-shaped vessel, by pipes fitted with taps, and reaching to the bottom of the latter. The lead-lined vessel is provided with a stirrer, and has also a dome from which one pipe leads away through two calcium chloride washers to a gasholder, and another pipe communicates with a vessel containing carbonic acid under a pressure of six atmospheres. Below is a filter communicating with the lead-lined vessel by a pipe also reaching to the bottom of the latter. A portion of the contents of the two first-named cisterns are run into the mixing vessel and agitated. Carbonic acid is evolved and passes away to the gasholder. When all the free acid is saturated, the carbonic acid under pressure is admitted, and drives the turbid contents of the mixing vessel over on to the filter below. The liquor passing from this is concentrated for the recovery of Glauber's salts.—A. R. D.

Improvements in the Manufacture of Bichromate of Soda. E. P. Potter and W. H. Higgin, Little Lever, near Bolton. Eng. Pat. 5552, November 12, 1884.

THE salts thrown out from the chrome-liquor (referred to in Letters Patent No. 587, and No. 3329 of 1883) on concentration, are washed with hydrochloric acid in the cold. The sodium chloride remains behind, while the acid liquor contains the chromates in solution, and is used for bichromating further quantities of vat liquor.—A. R. D.

Improvements in Apparatus for Generating and Hydrating Sulphur Dioxide and like Gases and Vapours, partly applicable to Purifying other Gases. A. M. Clark, London. Communicated by W. Maynard, New York City. Eng. Pat. 6982, Nov. 17, 1884.

THE sulphur is burned in cups contained in a chamber to which air is admitted through a funnel-shaped inlet, having the inner end the smaller. A goose-neck pipe leads from the top of the chamber to a closed box provided with a funnel delivering into another box below. Water is delivered by a pipe into this funnel, which has groved sides, so that the liquor running round, as well as downwards, forms a vortex, and draws away the vapours brought from the burning chamber by the goose-neck pipe. The gases, which are not absorbed by this washing, pass into the lower box. A pipe in the upper portion of this allows for the escape of the insoluble gases, the said pipe being provided with a scrubber of lime or other suitable material, to free the gases from all trace of acid vapours. To increase the efficiency of the water funnel as an aspirator, it may be revolved mechanically if necessary.—A. R. D.

Improvements in the Manufacture of Ammoniacal Salts, and in the Purification of Gas. A. McDougall, Penrith. Eng. Pat. 15,496, November 25, 1884.

SULPHUROUS acid gas, as obtained from a sulphur or pyrites burner, is forced through ammoniacal liquor, which also becomes concentrated by the passage of the hot gases. The ammonium sulphite which crystallises out, is oxidised in the air to ammonium sulphate. The solution of acid ammonium sulphite is used to wash coal gas, whereby ammonia is absorbed, and the sulphur compounds are decomposed, and sulphur separated, which latter is used in the burner as a source of sulphurous acid for the continuation of the process.—G. H. B.

Improvements in the Manufacture of Bichromate of Potash and other Chromates. Sidney Pitt, Sutton, Surrey. Communicated by Henry Bower, Philadelphia. Eng. Pat. 4102, November 27, 1884.

IN the ordinary process for the manufacture of chromates, whereby chrome ore is calcined in an oxidising furnace, with calcium hydrate or carbonate and the hydrates or salts of potash and soda, and the resulting mass lixiviated, a large percentage of the chromic acid being in a state of complex combination with iron, alumina and lime, obstinately resists solution. The present invention is for accomplishing this solution, by adding an alkaline carbonate to the mass in lixiviation, and then passing carbonic acid through the same. By this means all the chromic acid may be obtained in solution. A slight excess of carbonate—about five per cent.—must be used over and above the quantity equivalent to the as yet insoluble chromic acid, and the carbonic acid used must of course be free from all traces of sulphurous acid.—A. R. D.

Improvements in the Manufacture of Alkalis and Alkaline Salts. Sidney Gilchrist Thomas, Westminster. Eng. Pat. 4268, November 28, 1884.

IN the manufacture of alkaline phosphates and silicates from alkaline chlorides or carbonates, by treatment with molten phosphoric or silicious iron, in a basic or neutral-lined reverberatory furnace or converter, the reaction is accelerated and excessive volatilisation prevented by the present invention, which consists in mixing the chloride or carbonate with magnesia, lime, oxide of iron, or oxide of manganese, and compressing or fusing the mixture into bricks.—A. R. D.

Improvements in and relating to the Manufacture of Salt from Brine and Apparatus therefor. G. C. Denison and J. E. Higgin, Eureka Salt Works, Anderton. Eng. Pat. 4452, December 4, 1884.

A SYSTEM of pipes is so placed under the evaporating pan that the brine passing through the same on its way to the said pan, receives the heat of the furnaces, and thereby, to a certain extent, protects the pan bottom from burning. The pipes are arranged in rows across the flues, and have their ends connected by U-shaped junctions, the outside ends of which are closed by blank flanges or removable plugs, to make the whole length of each pipe accessible for cleaning. One end of the pipe system communicates with the pressure main or an elevated cistern supplying cold brine, and the other end delivers into the pan. This outlet is of diminished area to keep the brine in the pipes under pressure. The supply is preferably so regulated that the brine is delivered into the pan at a temperature just above boiling point.—A. R. D.

Improvements in the Treatment of Chloride of Sodium for the Production of Bleaching Powders and other Materials therefrom. W. S. Richardson, Gateshead, and W. J. Grey, Gateshead. Eng. Pat. 4417, December 5, 1884.

SOLUTION of sodium chloride is decomposed by an electric current. The chlorine evolved is used for making bleaching powder, the caustic soda is used as such or converted into carbonate, and the hydrogen is available for fuel. For the production or chlorine and metallic sodium, the fused chloride must be substituted for the solution of the salt.—A. R. D.

Improvements in the Manufacture of Chromates and Bichromates. W. J. A. Donald, Hillhead, Glasgow. Eng. Pat. 4811, December 15, 1884.

THE ordinary process for the manufacture of chromate of potash is followed in its first stages, with the exception that for the potash salts the sulphate, carbonate, or hydrate of soda is substituted. On lixiviating the batches from the chrome furnaces, a mixed solution of chromate of soda, sulphate of soda, etc., is obtained. To eliminate the sulphate, barium or calcium chloride is added, which causes an insoluble sulphate to precipitate, and leaves chloride of sodium in solution with the chromate. These may be separated by taking advantage of their different solubilities. To obtain sodium bichromate, sufficient sulphuric acid is added to the chromate to combine with half its soda. It is unnecessary to eliminate the sulphate present before this treatment, because it can be removed afterwards together with that formed on the addition of sulphuric acid to the chromate, as described above.
—A. R. D.

Improvements in the Manufacture of Chromates and Bichromates. W. J. A. Donald, Hillhead, Glasgow. Eng. Pat. 5948, December 15, 1884.

THE almost pure chromate of soda prepared as per application 4811, bearing even date with the present, is treated with its equivalent quantity of caustic lime, whereby chromate of lime is precipitated, and caustic soda remains in solution. These are separated by a hydro-extractor or filter press. The chromate of lime may be converted into bichromate by treating it with the equivalent of sulphuric acid to combine with half the lime, and evaporating until the sulphate of lime precipitates out, when it is removed by suitable means. The remaining solution, evaporated to dryness, gives very soluble and pure bichromate of lime.—A. R. D.

Process for Gilding Pottery. Ding. Polyt. Journ. 255 [3], p. 126.

THE "Ilmenauer Porzellanfabrik" in Ilmenau (Germ. Pat. No. 29566, February 15, 1884) gives the following process for this purpose. After a preliminary heating (to a red heat) a paste of gum and porcelain metal is applied by hand or otherwise, so as to form a pattern—*i.e.*, only the portions which are to be gilded are covered with the paste. The articles are dusted with powdered glazed porcelain and then dried until the small fragments dusted on are held by the gum paste. The articles are then burnt up and after cooling the raised parts (the so-called "*Décor*") are painted with gold, silver or other metallic colours and then the goods are fired as usual in the muffle. When finished the raised parts appear either biscuit or shining.—H. A. R.

Action of Dilute Acids on Bottle-glass. Dingl. Polyt. Journ. 255 [3], 127.

In a manufactory of artificial effervescing wines it had been noticed that all wines bottled from a new delivery of bottles turned turbid. E. Egger (Archiv für Hygiene, 1884 p. 68) tested the behaviour of various bottles towards dilute tartaric, hydrochloric and sulphuric acids and found that in some bottles the acid was reduced in quantity to a considerable extent in a short time. The analysis of two bad bottles (I. and II.), two pretty fair ones (III. and IV.) and two good ones (V. and VI.), yielded the following results :—

No.	SiO_2	$Fe_2O_3+Al_2O_3$	Mn	CaO	MgO	Na_2O	K_2O
I.	53·15	13·11	Traces	11·69	0·81	11·83	3·21
II.	52·90	12·85		15·88	0·95	11·27	3·16
III.	56·31	11·31		16·05	1·15	11·41	3·16
IV.	55·02	12·11		16·21	1·01	12·11	3·59
V.	62·95	6·80		16·72	1·80	9·26	1·10
VI.	57·16	11·79		11·79	0·90	15·41	2·72

A good glass-making mixture should contain enough SiO_2 that the fifth or sixth silicate of the alkali metal and the simple or double silicates of other oxides may be formed. For alumina we must assume the third silicate which softens at a white heat. Besides these there must be present a sufficient quantity of amorphous silicates to prevent devitrification. None of the above samples of glass contains enough silica for forming compounds which can be termed completely proof against acid fluids.—H. A. R.

Contributions to Our Knowledge of Cements. Dingl. Polyt. Journ. 255 [2], 76-79.

When cements are treated with water, H. Lechatelier (*Revue Industrielle* 1884, p. 452) finds that not only does calcium hydrate dissolve out but many other compounds. It is best then to use the least possible amount of water. He further notices that cements which have hardened quickly contain only a little free lime, when slowly a large quantity. By the gradual treatment of cements with water he thinks various compounds of lime with ferric hydrate, alumina and silica are formed in the solution. His analysis shows that these oxides are present in a litre of water in the proportion of the following theoretical compounds :—

	Grammes.
CaO_2H_2	1·3
$Fe_2O_3.4CaO.12H_2O$	0·6
$Al_2O_3.4CaO.12H_2O$	0·2
$SiO_2.CaO.3H_2O$	0·05

And he considers that these compounds, therefore exist in the cement.

Ed. Landrin (*Compt. Rend.* 1884, 98, 1053) has formed mixtures of lime and silica in proportions equivalent to the various silicates. A mixture of $3CaO+SiO_2$ when heated to whiteness hardens by the action of either water or carbonic acid—he calls it "Pouzzo-Portland." A mixture of $2CaO+SiO_2$ only once yielded a porous mass having hardening properties when treated in the same way. Similar unsatisfactory results were obtained with $CaO+SiO_2$, which only after prolonged heating yielded a mass which set with difficulty and did not harden under water.

De Perrodil (*Génie Civil*, 1884, 6, 30) found that a sample of Longuetty and Co's. Portland cement had the composition :—

CO_2	23·8
SiO_2	1·3
Al_2O_3	8·9
Fe_2O_3	2·0
CaO	63·6
MgO	0·4
	100·0

When exposed to air or water it increases in hardness and absorbs water. The power of resistance of the mortar was greater under water than in air.—S. R.

A Method for Estimating Alumina in Cements. H. Prunier. Journ. de Pharm. et de Chem. 5, 87.

The cement is warmed with dilute nitric acid and the liquid treated with ammonia solution till neutral, using tropæolin as indicator. A known volume of semi-normal ammonia solution is then added, the solution diluted to a fixed volume and filtered. Part of the filtrate is titrated back with semi-normal nitric acid thus giving the amount of ammonia used to precipitate the iron and aluminium. The amount of ferric oxide present in the cement is determined by potassium permanganate, the difference then gives the amount of alumina.—S. R.

Artificial Marbles, Granites, etc. J. B., W. S. and E. S. Shaw, Stafford. Eng. Pat. 386, January 2, 1884.

Clay, cement or plaster is rolled, run or beaten out on a board or slab, into a "bat" of the desired size and thickness, which is then dried until it cracks in different directions. The cracks or fissures are now filled up with coloured clay, metallic and other colours, and water, etc., the bat being finally fired in the usual way.

—E. G. C.

Improvements in the Manufacture of Marble. A. Guattari, Paddington. Communicated by Michele Soderini, Florence. Eng. Pat. 2640, February 2, 1884.

This invention relates to the manufacture of marble from sulphate of lime or gypsum, of which the several natural varieties may be used for the purpose—viz., selenite or sparry gypsum, lithoidal, massive or compact gypsum, anhydrite, pulverulent selenitic sulphate of lime, and fibrous, saccharoid, or calciferous gypsum. The first operation is the dehydration of the gypsum, which is effected in suitably constructed stoves, the temperatures of which vary with the different species of gypsum, from 50° to 244° C. The dehydrated rock is then hardened by being placed in a bath, consisting, as the case may be, of silicate of lime, sulpho-silicate of potash, acid fluo-silicate of potash, double silicate of potash and manganese, etc. Among the other substances employed are chloride of lime, sulphate of potash, phosphates of lime, soda, and potash, borax, etc. The material undergoes a second dehydration after being taken out of the bath. A second bath is frequently requisite, followed by a final process of dehydration. Various colours are imparted to the marble by the use of the following: Cadmium sulphate, yttrium chromate, and lithium chromate, which furnish yellows; dragon's blood, scarlet madder-root, sesquioxide of iron, and didymium sulphate, which give reds; salts of copper, which produce blues and greens; and other compounds.

—E. G. C.

Improvements in the Manufacture of Marble. Augusto Guattari, Paddington. A communication from Michele Soderini, Florence. Eng. Pat. 2787, February 5, 1884.

Sculptured objects in alabaster are hardened and converted into artificial marble by being heated to 37·5° to 50° C., and then immersed in a solution of 8 parts borax, and $\frac{1}{30}$ part potassium biphosphate, in 100 parts of water, at 22·5° C. After immersion in this solution, the objects are again heated in a suitable stove, this time to a temperature not exceeding 150° C.; lastly, they are allowed to cool, and then again immersed in a solution of borax, to which is added nitric acid, varying in quantity from 50 to 30 per cent. of the water of the solution. The process may be modified by substituting oxalic for nitric acid, and by finally rubbing the objects with a mixture of Canada balsam and naphtha.

—E. G. C.

Imitation Marble. Augusto Guattari, Paddington. Communicated by Michele Soderini, Florence. Eng. Pat. 2847, February 6, 1884.

SCULPTURED objects in gypsum are dehydrated and coloured in one operation, by being immersed in a hot preparation of bitumen of suitable strength. A hard imitation marble, of a fine black colour throughout, is thus obtained.—E. G. C.

Improvements in Brick Kilns. H. J. Alison, London. A Communication from S. W. Underhill and G. E. Fisher, Rochester, N.Y., U.S.A. Eng. Pat. 13,260, October 7, 1884.

THIS invention consists in the construction of a "permanent base" of a brick kiln—*i.e.*, "a system of furnaces, flues, and reservoirs permanently constructed to support the pile of unburned bricks," the objects being "to obtain a greater percentage of perfectly burned bricks than results from the ordinary methods of burning; to secure economies and durabilities in construction; and to save labour and fuel." The brick kiln base is constructed of fire-clay, or other suitable material, moulded *in situ* by means of removable moulds or forms, and is furnished with a series of passages or hot air reservoirs, which extend through from one side to the other. From these reservoirs lead upwards a number of flues, the end flues being larger than those located nearer to the centre of the kiln-base.—E. G. C.

Improvements in the Manufacture of Artificial Stone. J. Hatfield, Kew. Eng. Pat. 14,621, Nov. 5, 1884.

To a mixture of one part hydraulic cement, one part crushed granite, and three parts blast-furnace slag, with a suitable quantity of water, the inventor adds one part of the substance known as slag-wool; the result is said to be a strong, tough, and durable stone.—E. G. C.

X.—METALLURGY, MINING, Etc.

On the Employment of Different Kinds of Fuel in Blast-Furnaces. Dingl. Polyt. Journ. 254 [4], p. 167–177.

H. FEHLAND (*Stahl und Eisen*, 1884, pp. 331 and 497) publishes some investigations on the time which a charge requires for passing through a blast-furnace. A certain Rhenish works, making white pig-iron, charges their furnace in 24 hours 40 times; each charge consisting of

3·75 tons ore	(1cb.m. = 1900kg.)	= 1·97cb.m.
1·25 „ lime	(2 „ = 1500kg.)	= 0·83 „
1·90 „ coke	(1 „ = 450kg.)	= 4·20 „
		7·00cb.m.

The cubical contents of the furnace is C = 232cb.m.; the latter therefore holds 33 charges, but as the charge sinters together, ⅛ of the whole, or four more charges can be added. The time of passage for that furnace would therefore be 22 hours. A Westphalian works makes 34 charges, each of

3·20 tons ore	1·68cb.m.
1·10 „ lime	0·73 „
1·65 „ coke	3·67 „
	6·08cb.m.

The cubical contents is here C = 164cb.m.; it therefore holds 30½ charges, and the time of passage is 21 hours. An Austrian works has 22 to 24 charges, each of

6·72 tons ore	3·62cb.m.
1·78 „ lime	1·13 „
3·80 „ coke	10·13 „
	14·88cb.m.

C is equal to 253cb.m.; it can hold 19 charges, and the time of passage is 19 to 21 hours. A far shorter time of passage can be attained at the cost of a larger consumption of coke. A Styrian works, working their furnace with charcoal, allow the charge to remain in the furnace for 14·7 hours. It further appears that for making

Iron rich in phosphorus	the time of passage for a charge is	18 hours.
Thomas-iron		17 „
Spiegel		17½ „
Iron for casting purposes		36 „

J. L. Bell read a paper at the meeting of the Iron and Steel Institute on the use of coal in blast-furnaces (*Iron*, 1884, vol. 23, p. 373). This paper would lose much of its importance by being abstracted.

F. Kupelwisser (*Oestr. Zeitschr. f. Berg. und Hüttenwesen*, 1884, p. 9) discusses the use of brown-coal in blast-furnaces. It can be employed either in the raw state, or coked, or by gasifying it and conveying the gases into the furnace. However, it can never be used by itself to replace coke, and after an extensive series of experiments it has been found that one part of brown-coal must be mixed along with three or four times its weight of coke. A host of investigators tried to convert brown-coal and lignite into coke, so that it could be employed exclusively in blast-furnaces, but all their efforts failed on account of the coke breaking up in small pieces, when exposed to heat. Others tried to obviate this evil by applying a substance which was to cement the pieces, and, indeed, W. Reuss and A. Hofmann seem to have lately solved the problem in this manner. Their process, which is kept secret, is worked at Sillweg, and of a charge of 2100kg. brown-coal, 56% is obtained in large lumps, and only from 30 to 40kg. in smalls.

W. Schmidhammer publishes a calculation on Bull's process for the use of water-gas in blast-furnaces. Supposing that 1kg. coal yields 1·53cb.m. water-gas, consisting of equal parts of carbonic oxide and hydrogen, the author calculates that 100kg. iron require 87·12kg. gas, for which production 57·15kg. coal are required. If carbonic oxide and hydrogen take an equal share in the reduction, and the relation of carbonic acid to carbonic oxide in the furnace waste-gases be equal to 0·63, the following calculation for 100kg. iron would throw a light on the economy of the process:

40·4kg. gas are required for the reduction of the roasted ore. The gas, consisting of 37·7kg. carbonic oxide and 2·7kg. hydrogen, burns to 59·2kg. carbonic acid and 24·0kg. water. For the reduction of 100kg. iron from their combination with 42·85kg. oxygen 42·85 × 3983 = 170671 calories are consumed.

40·4kg. gas yield 40·4 × 5680	= 229,472cal.
Less 10% loss	= 22,947 „
Leaves for disposal	= 206,525cal.

The process of reduction therefore shows an excess of 206,525 − 170,671 = 35,854cal. To heat up and fuse the iron and the slags formed, are required:

For 100kg. iron	30,000cal.
„ 30kg. slags	13,500 „
Total	43,500cal.
And to keep the mass in a fluid state, and for losses	46,500 „
Grand total	90,000cal.

which can be produced by the combustion of $\frac{90000}{5680}$ = 15·8kg. gas, with a blast 800° C. hot. The 15·8kg. gas consist of 14·7kg. carbonic oxide and 1·04kg. hydrogen. The products of combustion are $\frac{14 \cdot 7 \times 44}{28} = 23 \cdot 1$kg. carbonic acid and 9 × 1·04kg. water. The oxygen taken from the blast therefore amounts to 23·1 + 9.39 − 15·8 = 16·69kg., which are mixed with $\frac{16 \cdot 69 \times 77}{23} = 55 \cdot 8$kg. nitrogen. The quantity of air required is therefore 16·69 + 55·8 = 72·49kg. The carbonic acid in the waste-gases amounts to

Produced at the tuyeres	23·1kg.
„ by the reduction of ore	59·2kg.
Total	82·3kg.

The waste-gases are supposed to contain an equal quantity of carbonic oxide; the furnace therefore requires an excess of $\frac{82\cdot3\times100}{93\cdot3}=88\cdot1$kg. gas. The total quantity of gas required now amounts to $15\cdot8+40\cdot4+88\cdot1=154\cdot3$kg., for which production $\frac{1\cdot64\times154\cdot3}{2\cdot5}=101$kg. coal are wanted. The heat of the waste-gases and other small sources of loss or production of heat were left out of consideration in order to simplify the matter. It will, of course, be necessary to compare these figures with results obtained by the actual working of the process. From a practical point of view it appears probable that the work in the furnace will be rendered more difficult on account of the column of ore not being kept loose, owing to the absence of coke. The same circumstance will also offer difficulties to the passage of the gas, especially as there must be in some place of the furnace a zone where the slag is not yet in a fused state, but already sufficiently soft to resist the passage of the gas.—S. H.

The Utilisation of the Waste Gases of the Blast Furnace. Dingl. Polyt. Journ. 254 [6], 254, 1884.

ANALYSES of blast furnace gases, published by Bunsen in 1839, showing that these contained considerable amounts of carbonic oxide, methane and hydrogen, confirmed the opinions advanced by Aubertot, Curaudaw and others, that these gases possessed considerable value as fuel, and gave an impetus to research, as to the best methods for their utilisation. A historical summary of the most important work upon the subject is here given, special attention being paid to improvements in and inventions of plant and processes described or patented in 1884.

Fig. 1.

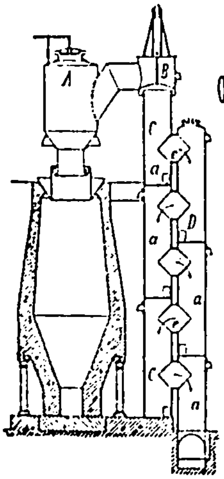


Fig 2.

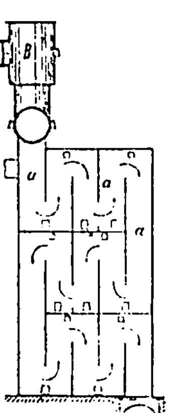


Fig. 3.

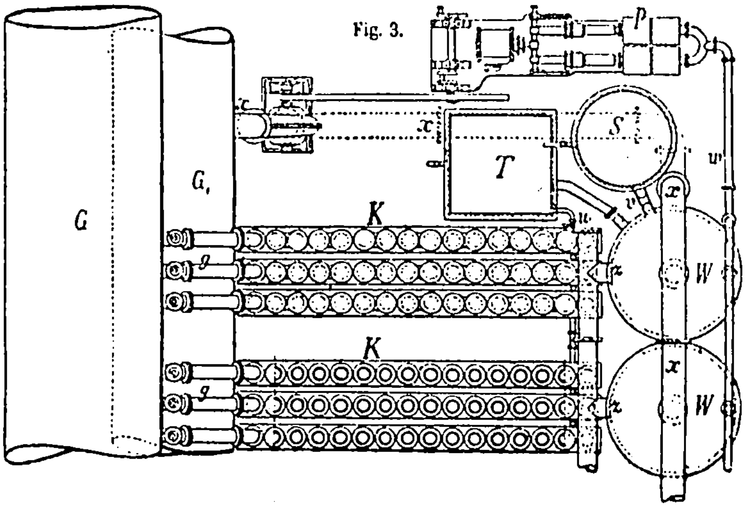
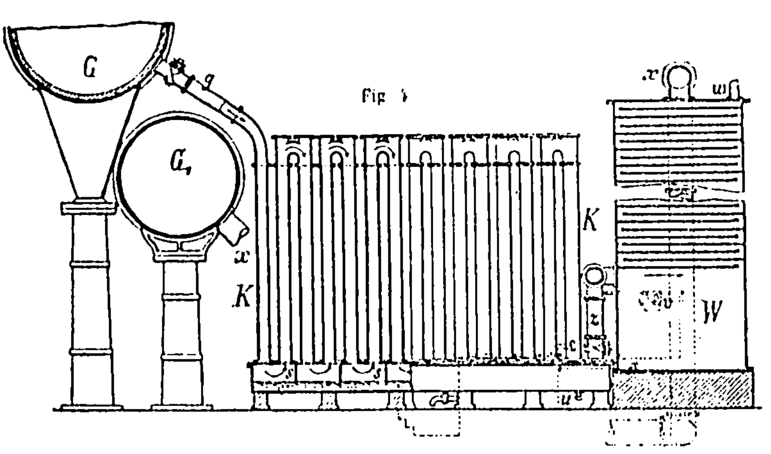
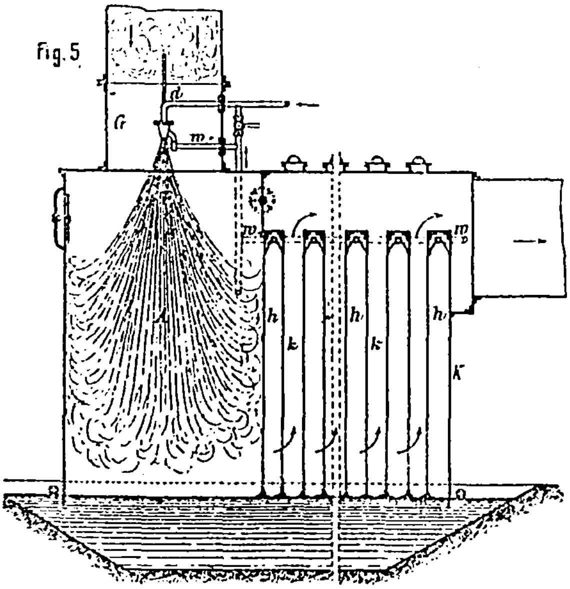


Fig 4.



The applicability of blast furnace gases to heating purposes, is lessened by the presence of flue-dust, water vapour and carbonic acid. For the elimination of flue-dust, Schrader and Macco (Ger. Pat. 28,003, January 13, 1884) allow the waste gases to pass from the cone into a wide chamber A (Fig. 1), where, from the velocity of the current being decreased, the larger portions of ash are separated from the finer, and fall into the furnace. The fine dust is collected in the compartments of the tube arrangement CD, through which the gases take the circuitous course indicated by the arrows. In Fig. 2 a box arrangement is shown, which may be substituted for the tubular system of Fig. 1. The filtration of the gases through slag-wool, is recommended by K. Möller; if sufficient surface of this be supplied to cool the gases below 100°, a portion of the aqueous vapour, and likewise tar and ammonia, if coal had been used, are collected. The co-application of water assists the condensation of ammonia. Cooling and washing chambers, devised by Alexander, as employed at the Gartsherrie Iron Works, and by means of which one ton of ammonium sulphate is recovered daily from the gases of two blast furnaces, are described by Lürmann (*Stahl und Eisen*, 1884, p. 35), and are illustrated by Figs. 3 and 4. The gases pass from the furnace by the main pipe G, through pipes *g*, the number of which is proportioned to the temperature and amount of the gases, into the coolers K, consisting of series of upright tubes, connected with each other alternately, above and below, so that the gases take the course indicated by the arrows. Cooling is effected simply by reason of the large surface exposed by the pipes to the air. The pipe which connects the lower ends of these tubes also serves to collect condensed liquids, tar and ammonia water; these are not permitted to rise to such a height as to obstruct the passage of the gas, but are drawn off by the overflow pipe *u*, to the tank T. The gases pass through *z* into the washing towers W, provided with perforated shelves of wood or metal; a stream of water trickles from *w* down these shelves; the tar and ammonia, which have escaped condensation in K, are so collected, and pass from W into T and S. The watery liquid, which collects in S, is pumped by P to the top of the towers, and used repeatedly, until sufficiently enriched with ammonia. The cooled and washed gases proceed by *x* to the second main G, to be utilised as required. If it be desired simply to eliminate flue dust, the towers are unnecessary; but it is advisable in such a case to moisten

Fig. 5



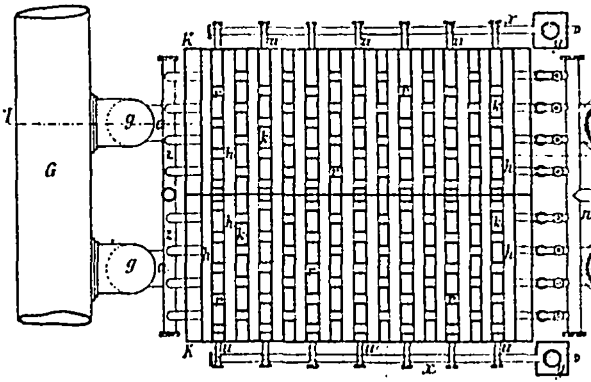


Fig. 6.

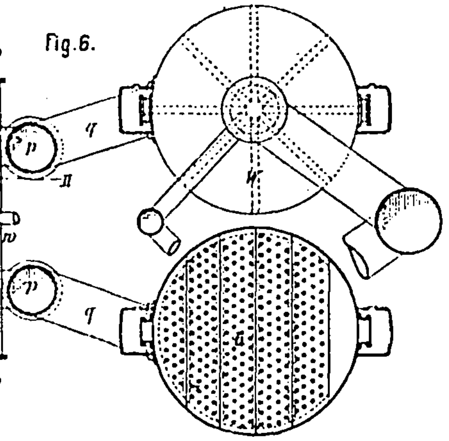
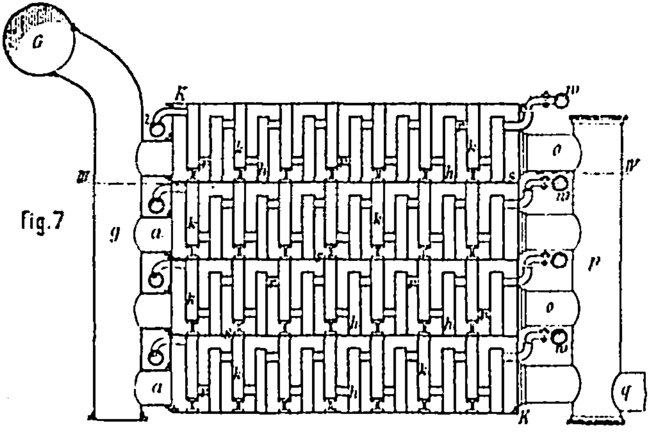


Fig. 7



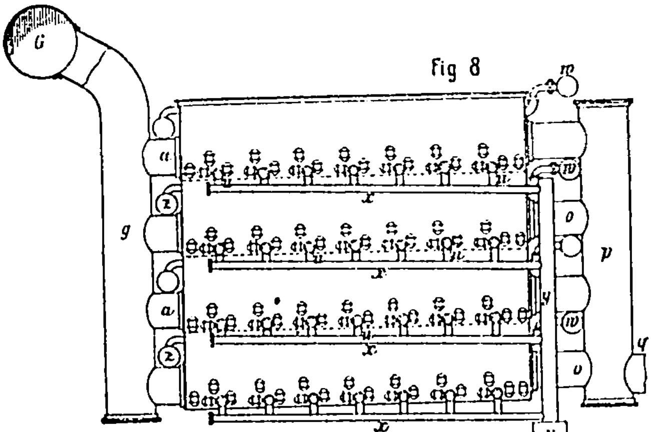
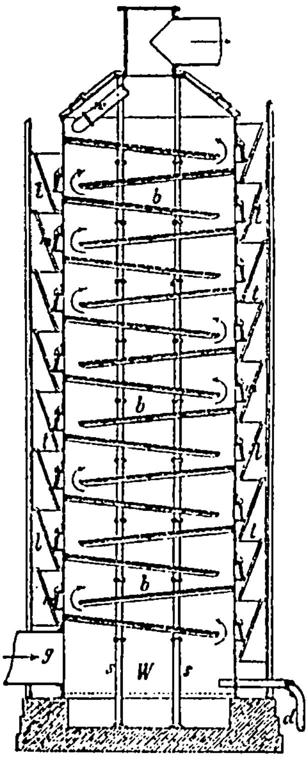


Fig 8

the gases before they enter the coolers. Belani advocates the arrangement illustrated in Fig. 5, for moistening the flue dust; steam is passed into the main pipe G, the moistening being completed by the application of a water spray in A, at the bottom of which chamber the wet dust collects. The cooling space K is divided into compartments by partitions *h*, down the sides of which streams of water flow, and effect the cooling of the gases, which pass up and down the spaces *k*. In Figs. 6, 7, 8, are given respectively the plan, elevation, and front view of the large cooling and washing chamber, devised by J. Alexander. Each chamber K is divided vertically into two compartments; these again, each horizontally, into four. The gases pass from the main G through the vertical pipe *g*, thence by the horizontal connections *a* into the compartments. Extending the whole width of the compartments, and riveted to the walls thereof, are rectangular boxes *k* and *h*, connected with each other by tubes *r*, through which a stream of water is caused to flow from *m*, that is to say, in a direction contrary to that of the stream of gas. The liquids, which are condensed in the compartments, are run off through tubes *u* into pipes *x* (Fig. 8) outside the chambers, thence away by *y*. The two vertical compartments K, oppose to the gases a surface of 2200 square meters, cooled by water; and one of 500 square meters cooled by air only. The gases leave the horizontal compartments by the short tubes *o*, thence pass into the upright pipes *p*, leave these at the bottom by *q*, and are thence led into the towers W, provided with perforated shelves of wood or metal, which are so fitted that the gases pass at each shelf from one side of the tower to the other, depositing any residual tar.

Fig. 9.



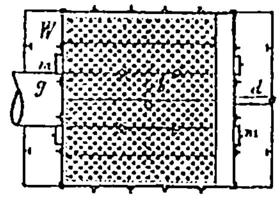
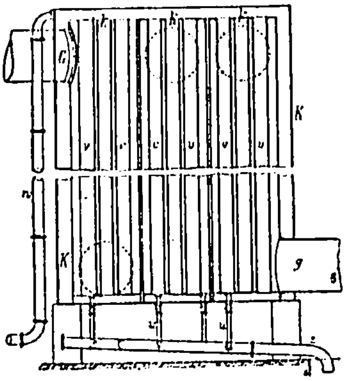


Fig. 10.

Fig. 11.



The rectangular wash tower W, shown in Figs. 9 and 10, with sloping shelves, is an improvement upon those of circular section, as the gases are distributed more evenly. The man-holes *m* are the more easily reached by the steps *t* outside the tower. The shelves are cleansed from tar by passing steam in the tower by *d*. This tower has a cubic contents of about 720cb.m., an outer surface of about 480 square meters; the shelf surface is in all about 560 square meters.

A cylindrical cooler, shown in Figs. 11 and 12, has likewise been devised by Alexander. Within the large cylinder K, seven smaller cylinders *k* are placed. These are connected with each other alternately, at top and bottom, so that the gases from G take a circuitous course to *g*. Within each small cylinder, seven pipes are fitted; these are open to the large cylinder K, which is filled with water. The cold water enters at W, the warmed flows away by *w*, liquids condensed from the gases are withdrawn by *n* and *z*. The surface cooled by water is about 1700 square meters; that cooled by air 288 square meters; and if necessary 2000 square meters of surface, cooled by water, can be obtained.

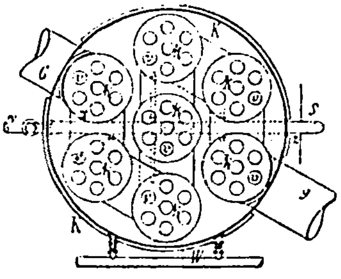
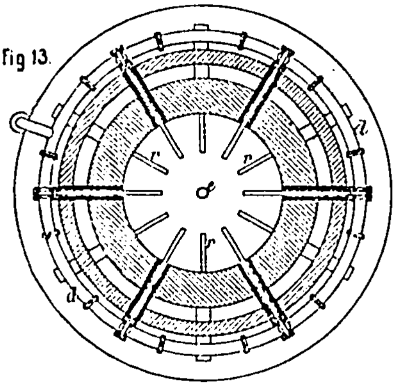
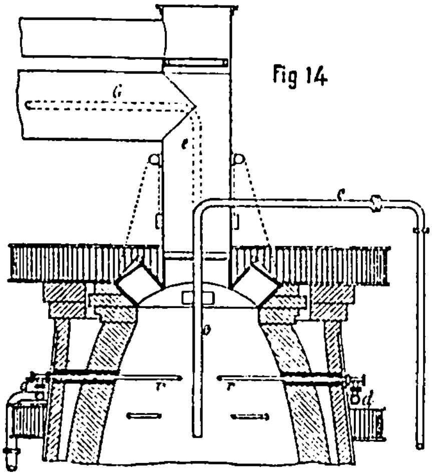


Fig. 12.

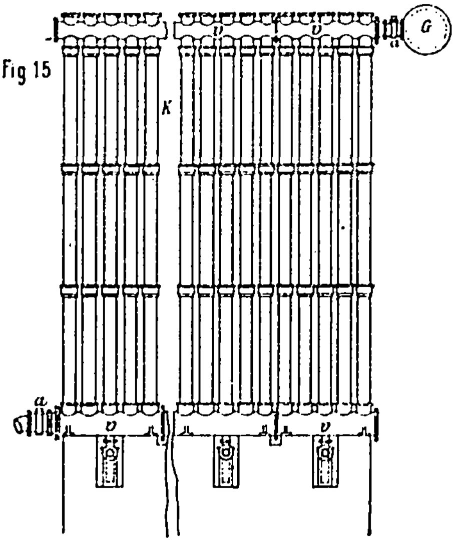
Fig 13.





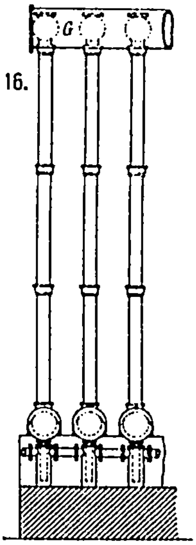
To increase the yield of ammonia, from blast furnaces using coal, it is proposed to introduce steam at numerous points within the cone, 2 or 3m. below the mouth. An arrangement for this purpose is shown in Figs. 13 and 14. Or the steam may be introduced by a single jet in the centre; and if desired can be superheated by allowing the steam supply pipe to pass for some distance in the interior of the pipe conveying away the waste gases.

Fig 15



The arrangement of pipes shown in Figs. 15 and 16 has been devised by Körting Bros., and is equally applicable to the cooling as to the washing of the waste gas. The tubes are arranged in three ranks; and connections between the individual pipes of each rank are so made that the gases pass up through one set of five pipes and down through the next. A system of 450 tubes of 300mm. diameter, and 3·5m. in length, gives a total surface, cooled by the air, of 1700 square meters. An injector may be advantageously applied at different points of such a system.

Fig 16.



The large washing chamber, devised by Young and Beilby, built of masonry, shown in Fig. 17, affords a means of decreasing the velocity of the stream of gas, and of thus allowing a complete separation of tarry matters. The gases are introduced by the conduit *g*, and enter the chamber by the openings *e*, covered by leaden bells. A fine rain of water, acid, or acidified water, is maintained during the passage of the gas. The washed gases pass away by G, the washings by *u*.

A somewhat more advantageous arrangement is that shown in Fig. 18. A series of such chambers may be built on different levels, so that the liquid employed for washing being introduced at the opposite end of the system to that at which the gas enters, passes simply by gravity through the whole series, until spent. The disadvantages of having to pump the liquid to the top of the chamber and there spray it, is obviated by the above plan. The size of the chambers is advantageously such that for 100cb.m. of gas passed through in twenty-four hours, at least 0·5cb.m. of space is provided. Large chambers, in which the cooled gases can come to rest and deposit their particles of tar, appear to be most suitable for the complete separation of the tar.

Fig.17.

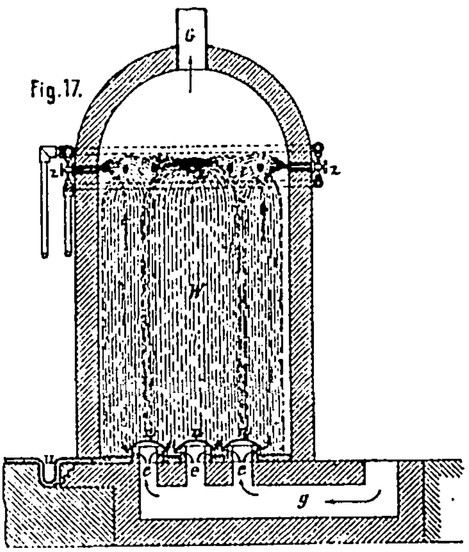
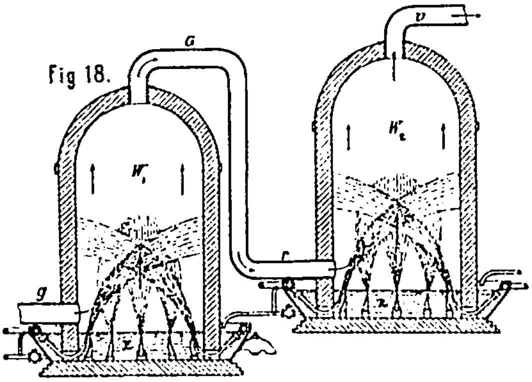


Fig 18.



For the regeneration of blast furnace gas,—*i.e.*, the reduction of carbon dioxide to the monoxide, Ehrenwerth recommends the employment of the shaft furnace, shown in Figs. 19 and 20.. This is filled, through F, with coke, wood charcoal, or the like. Through the pipe *w*, and tuyères *v*, air can be supplied. Through the pipe *g* and mouths *e*, the waste gases enter the furnace. The mouths permitting the gases to enter, may be 10 or 20cm. above or below the air tuyères, or even side by side with these, in which case they should have a wide section. If intermittent work is alone desired, the coke or charcoal is first brought to a sufficiently high temperature by the application of the air blast, which is then almost shut off, and the waste gases allowed to stream through until the temperature has fallen to such an extent as to render regeneration imperfect. The gas is now shut off, and the air blast again applied, and so on. For uninterrupted work, two regenerators, at least, are required. It is pointed out that the gases obtained during the heating up of the charcoal or coke are similar to ordinary generator gas; and, therefore, need not be lost. Blast furnace gases regenerated according to this plan, may be advantageously employed in the Siemen-Martin process. The following analytical results permit of a comparison between ordinary generator gas and blast furnace waste gas, ordinary and regenerated:—

Fig.19.

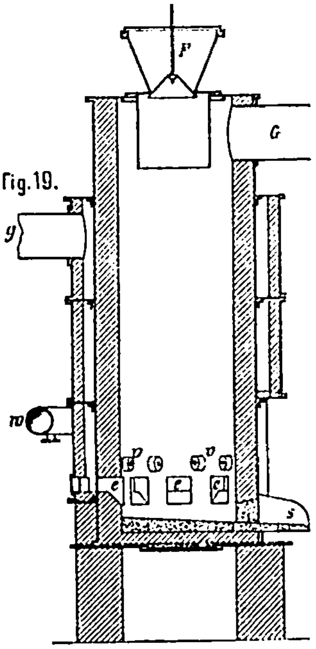
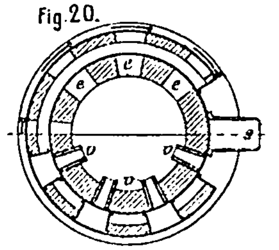


Fig 20.



	Generator Gas from		Blast Furnace Gas.		
	Coke.	Coal.	Ordinary.	Completely Regenerated. (theory)	Practically Regenerated.
CO	33·8	25·0	21·23	42·42	31·87
CO_2	1·3	6·5	20·60	0·00	8·37
Hydro-carbons	—	1·5	0·38	0·21	0·28
H	0·1	0·5	0·21	0·15	0·18
N	64·8	66·5	51·58	57·22	56·30
Total	100·0	100·0	100·00	100·00	100·00
1 kilo of gas yields calories	811	920	688	1087	923

F. Lürmann proposes to employ this regenerated gas in the blast furnace. The gases of the reduction zone would, in this case, contain less nitrogen than when, as usual, the carbon is gasified by direct combustion with atmospheric air.—W. D. B.

Method for the Manufacture of Malleable Nickel and Cobalt. Dingl. Polyt. Journ. 1884, 254, 315.

Nickel or cobalt (according to a statement of the Berndorfer Metallwaaren-Fabrik, Ger. Pat. 28,989, January 15, 1884), when in a melted state, take up carbon and oxygen simultaneously, the greater part of the latter being given off again on cooling, leaving the metal in a porous condition. Although by continued melting in graphite crucibles, under a cover of charcoal, the oxygen may be entirely expelled, the metal takes up the more carbon the longer it is kept in a melted condition, and thus becomes more and more brittle. In order to overcome these difficulties, the oxides of the metals are reduced at a moderate heat, and the porous cubes obtained immersed in a 4 per cent. solution of an alkaline manganate or permanganate. After drying they are melted, whereby the carbon is oxidised, the metal at the same time taking up a small quantity of oxygen. To get rid of this, a small quantity of black flux (obtained by igniting cream of tartar in a covered crucible) and some charcoal is added as soon as the metal flows freely. By the combined action of the charcoal and the potassium vapours generated from the black flux the oxygen is quickly removed. Instead of black flux aluminium, calcium, calcium-zinc, in quantities of one-tenth per cent. of the metal or mixtures of two or more of these materials in combination with charcoal may be successfully employed for the purpose of removing the last traces of oxygen. Enough charcoal is added to form a layer on the surface of the molten metal, through which the deoxidising metals are introduced.—F. M.

The Preparation and Application of Weiller's Silicon-Bronze. Dingl. Polyt. Journ. 254 [12], 492.

In the *Bulletin de la Société Industrielle de Marseille*, 1882, p. 150, appears a paper by X. Müller, engineer to L. Weiller, of Angoulême, from which the following information has been taken:—

The oxide present in a mass of metal or alloy occasions an absence of homogeneousness, which is fatal to the qualities regarded as essential. Experiments in Weiller's factory have established this, especially as regards the production of wire required of good conductivity and strength for electrical purposes. Carbon was found to be unfit for preparing a metal free from oxide, because an excess of carbon proved still more deleterious, and was unavoidable. Phosphorus gave better results, but traces of phosphorus in the metal lessened its conductivity and made it brittle; phosphorus being applicable only where resistance to impact or friction is desirable.

The advantage of using silicon has been already shown by Sainte-Claire Deville, but its cost was too great for general application. After three years' research, L. Weiller has obtained satisfactory results. Potassium silico-fluoride in presence of sodium supplies the silicon which effects the reduction of the oxide in the alloy, which at the same time takes up only traces of the metalloid, the excess floating with the slag. It is only necessary then to pour the alloy into moulds; the cast bars are afterwards turned and drawn in the ordinary way. This process of deoxydation is applicable to various alloys for different purposes, but especially for electrical connections. The silicon-bronze is well adapted for articles subject to pressure, impact or friction, such as valves, bearings, etc.

The electrical quality of silicon-bronze wire as now delivered by L. Weiller for telegraphic purposes corresponds to the following formula:—From the resistance R_0 at 0° the resistance R_t at t degrees is found according to the formula $R_t = R_0 (1 + kt.)$, and for silicon-bronze wire for telegraphs $k = 0{\cdot}0039$, and for telephones $k = 0{\cdot}0015$.

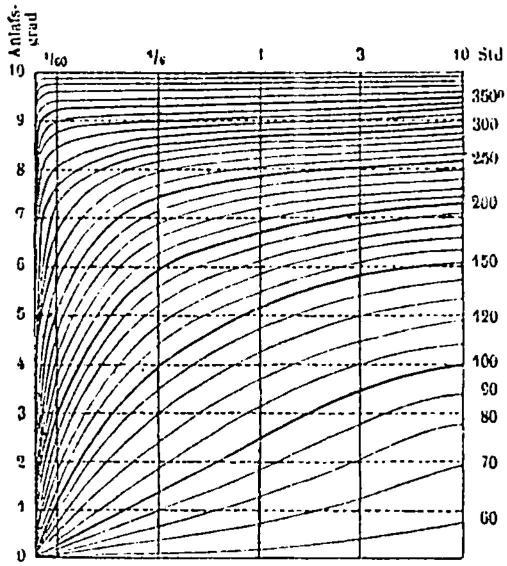
The reason for the difference in the two sorts of wire is that for telegraphs superior conductivity is the principal requisite, whilst the short circuits of telephone wires in towns allow some sacrifice of conductivity for the advantage of greater strength. Telephone wires of this material in Triest have satisfactorily withstood the most violent storm-winds. Complete security is assured with spans of 300 to 350 metres. On account of its strength this material does not require the support of iron wire for sub-aqueous cables of short length.

Tables of comparison with pure copper wire are quoted. Estimations of installations for 1000 kilometres show a saving of over 30 per cent. for silicon-bronze as against iron wire. Its use for telephones and telegraphs has been found successful in France and Austria by various companies and official departments. —C. H. B.

On the Influence of the Temperature of Tempering on the Quality and Constitution of Steel. A. Jarolimek. Dingl. Polyt. Journ. 255 [1], 1-10; [2], 56-60.

These two papers deal with the relations of the various physical properties of steel to one another, and to its chemical constitution. The author shows that the intermediate temperatures to which the steel is subjected, as well as the mechanical processes employed, affect considerably the final hardness and elasticity. An investigation on the specific volume of steel has long been wanted, and without doubt would throw considerable light on many of the difficult problems connected with this subject. The author has previously shown (Dingl. 1876, 221, 436, 518), that the hardness of steel depends on the rate by which it cools down from a definite critical temperature, which for most kinds is somewhere about 500° C. In his previous experiments he determined the hardness obtained by heating the steel to different temperatures, varying from that of boiling water to that of molten zinc. The temper of the steel depends on the time at which it is kept below another limiting temperature.

Stroulal and Barus (Würzburg, 1882), in a paper on the influence of the hardness of steel on its magnetic and other physical properties, have drawn attention to the fact that the thermoelectric, conducting and magnetic properties of a tempered steel wire depend in the same way on the limit of temperature to which it has been exposed. The amount of hardness was determined by taking long pieces of the steel and forming them into spiral springs, which could be then stretched by different weights. In this way the author demonstrates that the limit of elasticity of these springs of steel, as shown by their greater bending and twisting, increases with the amount of heat to which they have been exposed. This limiting temperature is about 300° C, but if after having been stretched, the wire is again heated, the traction power is found to have increased. Experiments are described with the following five operations being varied:—(1), heating the wire; (2), winding the wire into a spiral; (3), heating the spring; (4), stretching the spring; (5), heating the stretched spring.



From these experiments we learn that the elasticity is increased by long stretching of the wire, and that this elasticity is not lost by heating to 300° C. and then slowly cooling. He next discusses the relation of this experiment to the specific volume of the steel, and shows that the specific volume of the steel is of less practical value than the physical constants above described. The tenacity and solidity of the steel, in the same way, is directly influenced by the hardness, and so by the temperature and time employed in tempering.

W. Lorenz has described (Dingler's, 1880, 235, 183) a method for determining the hardness of hollow bodies. Compression of the steel, when still red hot, by means of two metal plates connected with a hydraulic press capable of giving a pressure of 1000 to 3000kilos. per square centimetre, causes the solidity to be increased.

The curves in the diagram show the rate of change of temper with increase of time at different temperatures.

The author has found that in some experiments with tools hardened in this way the results obtained were very satisfactory, but considers that further inquiries are needed before the different behaviour of steels can be explained and useful results obtained.—S. R.

On some New Alloys and their Uses. Dingl. Polyt. Journ. 256 [2], 73.

TH. FLEITMANN, of Iserlohn (D.R.P., No. 25,924 A., January 6, 1884), has shown that pure nickel and its alloys with copper, cobalt and iron can have other metals added without their losing the property of being welded, and therefore can still be used for making plate. The metals which can be added in this way are zinc, tin, lead, cadmium, iron and manganese up to as much as 10 per cent.; any additions, however, are not of much practical value, as the alloy of 25 parts of nickel with 75 of iron has a white colour, and resists the action of the atmosphere far better than iron alone.

—S. R.

A New and Improved Process and Apparatus for the Extraction of Metals from their Chlorides or Fluorides. Lorentz Albert Groth, 30, Finsbury Pavement, London. Communicated by Richard Grätzel, Hanover. Eng. Pat. 551, January 3, 1884.

THE extraction of certain metals, such as magnesium and aluminium, is to be effected on a large scale by the electrolysis of the fused chloride or fluoride in the presence of a reducing or neutral gas. The negative electrode may be the containing vessel itself or otherwise; the positive electrode (of carbon) is separated from this by a tube of non-conducting material with apertures (or open) at the lower end, but closed above, with the exception of a tube provided for the removal of chlorine or other gases evolved during the process. In close proximity to the positive electrode may be placed rods or plates, composed of the oxide of the metal under treatment mixed with carbon, which should be slightly in excess of the amount required to form carbonic oxide, and made up with tar or dextrine, dried and heated to redness. These serve to regenerate the haloid compound electrolysed. The whole is closely covered and provided with two tubes, one for the admission and one for the removal of the reducing gas.

—W. G. M.

An Improved Smelting Furnace. Charles Bramhall, Oughtbridge, near Sheffield. Eng. Pat. 586, January 3, 1884.

THE invention relates to an improved smelting furnace, for reducing iron ore or pig iron, for converting them into steel, and also applicable to smelting furnaces for other purposes. The furnace described in the specification, and illustrated by a drawing, has the general shape of a cupola or blast furnace, fitted with five or a larger or smaller number of tuyeres, and intended to be worked with gaseous fuel. The air and the gas are blown into the furnace by separate blowing engines and separate pipes, and pass each through two sets of receptacles filled with bricks heated alternately on the regenerative principle. The air and gas tubes unite near the inner wall of the furnace. The hot gases escaping near the top of the furnace are led by flues through the regenerators, thence to a chimney. Valves or dampers are introduced for the regulation of the supply of both gas and air.—B.

A New or Improved Method of Treating Sulphides and Oxides of Metals and Obtaining Products therefrom. Sir Francis Charles Knowles, of Lovell Hill, Bart., Mayfield, Isle of Wight. Eng. Pat. 7056, Jan. 3, 1884.*

IN pursuance of this invention, sulphides or oxides of iron are subjected to a full red heat in a closed retort, through which a current of coal gas, peat gas, or petroleum vapour passes, whereby the iron oxide is reduced to a metallic, or, on prolongation of the process, converted into a carburet. Ores so reduced are treated in a Bessemer converter with a small admixture of molten spiegeleisen, and subjected to the blast of a neutral mixture of air and carbonic oxide gas, which process is continued until complete fusion. For the production of a mild steel, a blast with a slight excess of air is used. With appropriate re-agents, and a non-silicious lining, phosphorus, if present, may be eliminated. Ores of other metals may be similarly treated.—B.

Furnaces for Making Malleable Iron and Steel. J. Burch, Stockport, and R. Allen, Manchester. Eng. Pat. 1086, January 9, 1884.

THE present improvements are supplementary to those described in Eng. Pat. 3250, 1882. The principal features of the former invention comprise three sections—viz., a main firegrate, combined with a reverberatory rocking hearth of unusual length, and a balling cylinder which rotates. The new system of continuous puddling consists in feeding a fresh charge of molten metal into the fore end of the furnace every time the hearth rocks to and fro, and the charges are, by the rocking motion, caused to follow each other throughout the whole length of the refinery chamber into the balling cylinder, from the far end of which the several charges are delivered in the form of puddled balls. The balling cylinder has a downward inclination from the end contiguous to the refinery chamber. The several charges of metal gradually become pasty and coherent, as, by the rotation of the cylinder, they are caused to move along a spiral gutter made in the form of a hollow curve around the interior of the cylinder; by this means all the charges in the cylinder are made to advance one turn of the spiral every time the cylinder rotates, and by degrees they become solid masses, which are gradually rolled in the curved gutter into the form of puddle balls, and which, as they slowly approach the firegrate at the end of the cylinder, are exposed to the increasing "final heat," and the slag becomes highly fluid, so that it readily separates from the puddle balls, and falls through a sloping grid, down which the balls roll to the trolly. The chimney is erected at, or contiguous to, the lowest end of the refinery chamber.—J. T.

Recovering Tin from Tinned Metallic Surfaces. A. P. Price, London. Eng. Pat. 2119, January 25, 1884.

THE superficially tinned metals are made to form the anode in a solution of caustic alkali, a dynamo electric machine or other electric generator being employed. The tin being dissolved may be obtained from the solution by electric agency or otherwise, or the resulting stannate may be employed in the arts.—J. T.

The Extraction of Metals from Carbon, or Substances known as such—namely, Graphite, Coal, Coke, Cinders, and Ashes. Annie Eliza Scott, South Kensington, London. Eng. Pat. 2162, January 26, 1884.

THE carbonaceous substance is mixed with salt and placed in a crucible in alternate layers with fragments of metal; on heating, the latter fuse and are to alloy with the metals contained in the former. Or the alloying metal (*e.g.*, copper, zinc, etc.) may be first fused and the carbon then added. From the residual soluble silicate any of the alloying metal oxidised is to be recovered.

—W. G. M.

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* This patent is either wrongly dated or wrongly numbered—7056, January 3, 1884. At that date the number of patents taken out had not reached much above 500.—B.

Improvements in Puddling Furnaces. George Morris and George Slater, both of West Bromwich. Eng. Pat. 3065, February 11, 1884.

THE improvement consists in the introduction of a cast-iron or brick water chamber between the flue-bridge and the flue of the puddling furnace, so arranged that the flame and products of combustion passing from the puddling chamber impinge upon the surface of the water, which is preferably at the same level as that of the brickwork in the ordinary furnace. The supply of water may be obtained from the tool bosh, used by the puddler for cooling his tools. The slag pressed over the flue bridge flows into the water and is granulated. The cooling action of the water prevents the rapid destruction of the flue stack by the hot gases and permits the use of an inferior brick.—W. G. M.

Improvements in obtaining Aluminium Bronze. Anthony Zdziarski, Brest-Litowsk, Russia. Eng. Pat. 3090, February 11, 1884.

CRYOLITE or other aluminous matter is fused with suitable fluxes in a crucible containing the metal with which the aluminium is to be alloyed (copper, brass, etc.). A current from a powerful dynamo machine is then passed through the liquid mass, using carbon as an anode and the alloying metal itself as the cathode. Silica must be absent or silicon will pass into the metal.—W. G. M.

Improvements in the Method of Protecting Submerged Structures of Iron and Steel from Corrosion and Fouling. F. Maxwell Lyte, London. Eng. Pat. 3536, February 18, 1884.

IN a previous communication (Eng. Pat. 5375, of 1883) the inventor showed that it is necessary to interpose between the anti-fouling paint and the metallic iron a coating serving to isolate the anti-fouling paint from the iron so as to avoid the rapid destruction of the former and the corrosion of the latter. Bitumen forms an excellent undercoating both in respect of cheapness and efficiency. The paint is produced by dissolving natural bitumen in turpentine, benzene, or benzoline to the requisite thickness, and adding, if desirable, zinc oxide or hydroxide, or glass, porcelain, burnt clay, silica, alumina, magnesia, powdered chalk, or calcareous rock, asphalte, barium sulphate, powdered coal, anthracite, coke or graphite, or the so-called silicate paint, and if considered necessary, drying oils so as to constitute a paint with which the iron is first coated and on which the anti-fouling paint is applied.—D. B.

Improved Basic Linings for Open Hearth Steel and Iron Furnaces. William F. Batho, 9, Victoria Chambers, Westminster. Eng. Pat. 3921, February 26, 1884.

THE basic lining is to be mixed with metallic iron (wire, scrap, etc.), in such a way that the metal will act as a bond, and will always form a portion of the wearing surface of the lining.—W. G. M.

A New or Improved Method of Extracting Metals from the Material found combined with Coal, commonly known as Ironstone. John Miles, High Holborn, Middlesex. Eng. Pat. 4333, March 4, 1884.

THE coal containing the ironstone is to be burnt and the residue strongly heated for 48 hours in a steel crucible with its own weight of scrap steel. It is then cooled in a closed vessel and the powder and pieces of metal are ready for any purpose to which the inventor may propose to apply them.—W. G. M.

An Improved Method of Tinning Plates. By Thomas Henry Johns and William Albert Johns, Clapton. Eng. Pat. 13,235, March 10, 1884.*

THE invention relates to a method of coating light sheets, generally called "taggers," or ordinary plates, without passing them through a tinning bath. As an illustration, there may be two baths side by side, the one containing coating metal for treating plates in the ordinary way, the other containing grease, and between the two a pocket also containing grease. Above the pocket the finishing rolls are placed. Plates having passed through the tin bath and into the centre grease pocket, are raised and passed through the finishing rolls, and when several such plates have been treated, they leave the rolls coated with a certain amount of metal. Other plates, such as "taggers," or ordinary kinds, having meantime been prepared in the grease bath; if one of these is now passed through the rolls it will receive a thin coat of metal. The rolls may be supplied or fed with coating metal in any other convenient way.—B.

An Improved Method and Apparatus for the Amalgamation of Free Gold. Rowland John Atcherley, of 52, Chancery Lane. Eng. Pat. 4865, March 14, 1884.

THE invention relates to apparatus by means of which the free gold to be saved from gold-bearing slimes, or pulp, is caused to pass through a continuous fine shower of mercury, and is thus brought into such intimate contact therewith as to be thoroughly amalgamated, and thus to prevent the escape of float or flour gold. The apparatus consists of a vat or trough, the bottom of which is perforated with a great number of small holes. The trough is placed above and along the flumes or launders conveying the slimes or pulp, and should be of the same width as the launders. A receptacle is placed at the lower end of the launders for catching and collecting the mercury after passing through the slimes, from which receptacle it is raised again to the perforated trough by means of an elevator, a pump, or in any other convenient manner, thus making the action continuous. Provision is made for collecting the mercury clear of slimes, and for straining off any solid or semi-solid amalgam before returning it to the trough.—B.

Improvements in the Manufacture of Chromic Compounds. Sidney Gilchrist Thomas. Eng. Pat. 5130, March 19, 1884.

THE invention relates to the manufacture of chromic compounds from chrome iron ore. The ore is first treated in a blast furnace, in which, by preference, an excess of coke or charcoal and very hot blast are used, so as to produce a pig containing nearly all the chrome alloyed with iron and carbon. This chrome pig is then treated in the molten state in a gas furnace or Bessemer converter having basic or neutral linings, such as lime, magnesia, or chrome iron ore. Into the converter, or furnace, there is introduced a quantity of lime, or of alkaline chloride, or of alkaline carbonate or hydrate, or of magnesia, more than sufficient to combine with the chromic oxide formed by the oxidation of the chromium as well as with any silicon or phosphorus present in the crude iron—potassic or sodic carbonate or hydrate are preferred. A slag consisting largely of alkaline or calcic chromate is formed, and, after lixiviation with water, the solution is treated for the manufacture of any chrome salt required.—B.

Improvements in the Manufacture of Sodium. Sidney Gilchrist Thomas, 9, Palace Chambers, Westminster Bridge. Eng. Pat. 6367, April 15, 1884.

WROUGHT or cast-iron retorts or tubes, with a thick lining of any refractory material unacted upon by sodium —*e.g.*, highly fired lime, magnesia, or dolomite, or graphite are used. Into these the mixture of sodium carbonate and carbon may be fed continuously; through them is passed a current of reducing gas (preferably water-gas) previously heated to a high temperature in small regenerators. The retorts will not require external firing. The gases, charged with sodium vapour on leaving the retorts, are passed through a condensing arrangement, and are then burnt in the regenerators.—W. G. M.

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* The above patent is either wrongly dated or wrongly numbered—13,235, March 10, 1884. At that date the number of patents taken out had not reached much above 4000.—B.

Improvements in Separating and Obtaining Silver from Metallic Compounds. Desmond G. Fitz-Gerald, Brixton, Surrey. Eng. Pat. 6371, April 15, 1884.

THE argentiferous metal is treated with nitric acid containing an oxidising agent, such as binoxide of lead, or of manganese, to recover the oxides of nitrogen otherwise lost. The silver in solution, as nitrate, is then precipitated as chloride by hydrochloric acid (preferably gaseous), thus leaving free nitric acid in solution, or by calcium, barium, or lead chloride—the nitric acid being afterwards regenerated by treatment with sulphuric acid, or the silver may be thrown down as oxide by calcium or barium hydroxide. The chloride, or oxide, is then deposited in an electrolytic cell, on a negative element of silver, using zinc or iron as the positive metal.—W. G. M.

An Improved Compound Metal or Alloy, chiefly designed for Deoxidising and Coating Metal Plates. Henry Harris Lake, Southampton Buildings, Middlesex. Eng. Pat. 6433, April 16, 1884.

THE proposed alloy consists of lead, tin, and zinc, together with a small proportion of sodium, in proportions varying with the use to which the coated metal is to be applied. The metals, after interfusion in a crucible, are ready for use; while fused the mixture is covered with a vegetable oil, or animal fat; it has a very low fusing point.—W. G. M.

Improvements in Obtaining Copper. Astley Paston Price, Lincoln's Inn Fields, Middlesex. Eng. Pat. 6722, April 23, 1884.

COPPER is precipitated from solution by finely divided iron, the liquid meanwhile being well agitated by steam, air, or otherwise.—W. G. M.

A New or Improved Process of Treating Iron. Alex. Melville Clark, 53, Chancery Lane, Middlesex. Communicated by Russell B. Abbott, of Albert Lea, Minnesota, U.S.A. Eng. Pat. 7940, May 19, 1884.

THE object of this invention is to produce from ordinary wrought iron a weldable iron of superior toughness and hardness. It is to be effected by heating the metal nearly to a welding heat, then rolling it in an intimate mixture of fourteen volumes of sand with one of manganese dioxide and one of common salt, by working, reheating, and repeating the treatment, and finally by again reheating to a weld heat and quenching in water. The mixture may, if preferred, be pressed into contact with the metal by any convenient method other than rolling.—W. G. M.

An Improved Method and Furnace for Obtaining Crude or Coarse Copper directly from Copper Ores and Mattes. Alex. Melville Clark, 53, Chancery Lane, Middlesex. Communication from Jules Garnier, Paris. Eng. Pat. 9498, June 27, 1884.

THE furnace is in the form of an inverted truncated cone, and is mounted on hollow trunnions to facilitate the discharge of its contents in case of emergency. The lower portion of the furnace is lined preferably with a material incapable of being attacked by the basic constituents of the ore—such, for example, as oxides of chromium, natural calcium sulphates, zinc silicate, titanium compounds, bauxite, calcium phosphates, etc.—whilst the upper part is lined in the usual way, the two linings being separated by a zone of refractory clay. If the ordinary lining be used throughout, the lower portion should be very thin and be air or water-cooled. The inert materials are applied in the form of bricks (or in the plastic state), made up with clay, lime, tar, etc. The blast, entering by the trunnions, passes through chambers surrounding the furnace, thus effecting the double object of heating the blast and cooling the furnace walls; thence it passes through tuyeres situated between the tap-hole, which is at the bottom of the furnace, and the slag hole. The ore, or matte, is charged in the usual way, and, when melted, fills the crucible up to the level of the tuyeres; the slag hole is then stopped and the air blown by high-pressure blast through the accumulating sulphide, resulting in the production of crude copper, which collects in the crucible and is tapped off at intervals; of sulphur dioxide, which passes off with the blast; and of oxides of metals, more basic than copper, which pass into the slag, and are removed also by tapping. The fusion of the matte may also be effected by a low-pressure blast, introduced above the slag hole, until the sulphide reach the level of the latter, when the high-pressure blast at the lower level is let on.—W. G. M.

Coating Metal, Glass, Porcelain, etc., with Ornamentation of Aluminium or Aluminium Bronze. C. D. Abel, London. Communicated by G. Gehring, Landshut, Bavaria. Eng. Pat. 13,425, October 10, 1884.

ALUMINIUM or aluminium bronze, either in the shape of foil or as powder, is applied to the surface by the aid of the following substances:—Sebacitate of alumina or resinate of alumina—that is to say, alumina soap—is mixed with oil of lavender or other volatile oil and the aluminium. The alumina soap is formed by precipitating a solution of either common soap or resin soap by means of alum. These alumina soaps are dissolved in volatile oils to form a thin lac, which is incorporated with the aluminium, and the mixture is applied to the surface to be coated by means of a brush. The surfaces so treated are then exposed to the open air or to heat, as the case may be.—J. T.

An Improved Process for Coating Iron or other Metals with Tin, Lead, or Terne. Adolph Gutensohn, Globe Wharf, Mile-End Road. Eng. Pat. 13,560, October 14, 1884.

THIS process consists in the substitution of a hot saturated solution of sal-ammoniac, together with a little hydrochloric acid and glycerine, containing a small quantity of resin, for the grease bath generally used preliminary to the tinning of the pickled plates.
—W. G. M.

Improvements in Treating Copper Matte. A. W. L. Reddie, Bream's Buildings, Chancery Lane. Communication from John J. and Robert Crooke, of New York, U.S.A. Eng. Pat. 14,853, November 11, 1884.

THE object of the invention is to separate objectionable impurities, such as arsenic, antimony, iron, and lead, and to recover the silver and gold contained in the matte, and to produce a pure copper at a minimum cost. The first or desilverising process is conducted in a reverberatory furnace of 2 tons' capacity, having a tap-hole, and a working and an end door; in front of the tap are a pair of 10-ton iron lead kettles. 3 tons of lead are heated strongly, 2 tons of the crushed matte added, and the mass well rabbled. A partial oxidation of the sulphur, attended by a rise of temperature, now occurs, and the lead alloys with the silver, gold, antimony, and arsenic. After a further rabbling for 15 minutes, 60 per cent. of the added lead separates, and in half-an-hour it is tapped into one of the kettles. A further addition of two tons of lead is now rabbled in for half-an-hour, and tapped into the same kettle. It is essential to success that the mixture be maintained at a low temperature, below the fusing point of the matte, or the silver will not be removed. The pasty plumbiferous charge is then transferred to a second reverberatory furnace, where the removal of all the lead, excepting about 500lb., is effected by reduction with 400lb. of anthracite slack, at a much higher temperature, and by subsequent tapping. The kettle lead is desilverised by zinc, and is then ready for a new charge. The desilverised regulus is run into sand moulds, broken up, and heated to dull redness, with blast from two 1-inch tuyeres. When at a dull red heat the blast is let on, and the mass is kept below the melting point of copper, and is well rabbled for an hour. Mass copper begins to form, and when the fragments no longer have a bright surface the blast is shut off. Eight per cent. of sand is now added for each 12 per cent. of iron originally present, and the heat raised for copper fusion. The slag formed should be pure black, free from red tinge, and containing less than 1 per cent. of copper; it is skimmed off as fast as it appears, until oxide of copper forms on the surface of the metal bath, when the copper is at once tapped into sand moulds, and afterwards remelted and brought to tough pitch. The slags carrying much lead are reduced by carbon. If the slag should have a red shade, 1 per cent. of raw desilverised matte will at once clean it of copper. The total loss of lead should not exceed 1 per cent.—W. G. M.

Improvement in the Treatment of Phosphatic Slags. Carl Scheibler, Berlin. Eng. Pat. 15,140, November 18, 1884.

When phosphatic slags—and especially those from the Thomas-Gilchrist process—are cooled very slowly, they are found to separate into two layers, the upper one containing the bulk of the phosphoric acid, the lower that of the iron and manganese. It is therefore proposed to run the slags into vessels lined with a non-conducting material, and allow them to cool slowly in bulk until the solidification of the outer surface occurs; the inner fluid portion is then run off, and is found to contain the greater part of the phosphorus as calcium phosphate, which may be treated for manure; the solid crust, containing most of the iron and manganese, is returned to the blast furnace. The longer the time allowed for solidification the more complete will be the separation. —W. G. M.

Improvements in the Manufacture of Phosphatic Salts. Sidney Gilchrist Thomas, London. Eng. Pat. 4947, December 12, 1884.

Phosphoric pig iron is run into a basic or neutral lined converter or furnace, into which magnesia to the extent of four or five times the weight of phosphorus calculated to exist in the iron has been already introduced. The usual basic or Thomas Gilchrist or Siemens operation is then carried on till practically all the phosphorus is eliminated from the iron, when the metal and slag are run off separately. The latter contains all the phosphorus as phosphate of magnesia, and is either fused or boiled with an alkali, or else treated with dilute hydrochloric acid for its recovery. The magnesia is also recovered and used over and over again.—A. R. D.

XI.—FATS, OILS, AND SOAP MANUFACTURE.

The Decomposition of Wool Grease. Dingl. Polyt. Journ. 255 [2], 88.

Ceryl cerotate is obtained by Buisine from wool grease by saponifying at 100° C. with alcoholic potash, then distilling off the alcohol forming the barium salt, and then treating with boiling alcohol. The ceryl alcohol, which is difficultly soluble, is obtained from the solution along with homologous crystallisable fatty alcohols. The part of the fat which is the most difficult to saponify contains the largest proportion of cerotic acid.—S. R.

On the Boiling Point and Specific Gravity of Glycerine. Dingl. Polyt. Journ. 255, 208, 1885.

G. Th. Gerlach, in his investigations on glycerine, started with so-called "double-distilled glycerine," which had a specific gravity of 1·23. This glycerine was distilled from a tubulated glass retort until the boiling point remained constant, and the distillation was continued for some time longer. The glycerine remaining in the retort was perfectly pure and clear as water. The corrected boiling point was 290° C. The glycerine boiled very quietly and uniformly, and, on account of its fixed boiling point, can be safely recommended for determining the point 290 on thermometers for high temperatures. The specific gravity of solutions of glycerine was as follows .—

Percentage of Pure Glycerine.	At 15° C.	At 20° C.
100	1·2653	1·262
90	1·2100	1·236
80	1·2130	1·209
70	1·1850	1·182
60	1·1570	1·155
50	1·1290	1·128
40	1·1020	1·101
30	1·0750	1·071
20	1·0190	1·018
10	1·0215	1·0235
0	1·0000	1·0000

—W. M.

Recovering Oil and Grease from Fibrous Material. E. S. Wilson and A. B. O'Connor, Camberwell. Eng. Pat. 2621, February 2, 1884.

This process has for its object the purification and recovery of oiled and greasy fibres, and extracting valuable products therefrom, by means of chlorinated alkaline leys, hypochlorites of soda or potash. The loose oil is first extracted by hydro-extractors or other suitable means. The waste is then boiled in water or very weak leys, any oil that rises to the surface being skimmed off. The liquor is then drawn off into tanks, that the oil or grease may come to the surface. (If the leys have been used, the addition of acid may be necessary to facilitate the separation.) The waste is then boiled in water containing a small percentage of soap; a solution of chlorinated leys is then added at a strength of 15-20° Tw., and the whole agitated at a temperature o 140-180° F.—J. T.

Hard Soap Making. C. D. Abel, London. Communicated by Die Fabrik Chemischer Produkte, Berlin. Eng. Pat. 6472, April 17, 1884.

This process has for its object the production of a hard soap that shall be practically almost completely freed from the lyes, and that shall contain much less salt than ordinary curd soap, while at the same time a much harder and more neutral product is obtained, containing also less water (from 20 to 25 per cent.) than that obtained in the ordinary way. The soap, separated by salt by the known methods, and before its separation from the lye by complete cooling has taken place, is introduced into a centrifugal machine driven at a high speed, and is subjected, while in a heated condition, to centrifugal action for a comparatively short time (from four to, at most, twenty minutes). By this means the separation of cocoanut oil soap can be perfectly effected. —J. T.

Apparatus for Cooling Oil in Order to Congeal Paraffin. N. M. Henderson, Broxburn. Eng. Pat. 9557, June 30, 1884.

The apparatus comprises a trough formed with a jacket space through which refrigerated brine or other suitable cooling fluid circulates; and in order to obtain efficient cooling surfaces there are placed within the trough a number of transverse vertical disc casings with thin spaces for the circulation of the cooling fluid. A horizontal rotating shaft passes through the centres of the disc casings, and carries scrapers which detach the paraffin as it congeals on the cooled surfaces; whilst a lower shaft, with agitating arms, breaks up and mixes the congealed paraffin so as to facilitate its discharge along with the oil.—J. T.

Apparatus for Extracting Oleaginous Matters from Bones, etc. L. Steinmüller and C. Steinmüller, Gummersbach, Germany. Eng. Pat. 11,104, August 9, 1884.

In this invention the petroleum naptha or other vapours required for the extraction of fatty matters are forced from the top of the apparatus over the substances to be treated, and pass to the bottom, carrying with them the fat extracted.—J. T.

Improvements in Materials for Lubricating Metal Moulds. H. J. Haddan, London. A Communication from C. F. Brush, electrical engineer, of Cleveland, Ohio, U.S.A. Eng. Pat. 3581, Nov. 17, 1884.

IN making lead castings, saponifiable and oxidisable oils have hitherto been used to lubricate the moulds, and the result has been the formation of a hard deposit, partly of lead soap, partly of oxidised oil on the mould-surfaces, which interfered seriously with the perfection of the casting. The inventor claims the use of vaseline, diluted with a hydrocarbon such as kerosene, describing it as a material for lubricating or coating moulds, a non-oxygenous or nonsaponifiable oily substance, and a non-oxygenous or non-saponifiable diluent, both incapable of complete evaporation at the melting point of lead.—W. L. C.

Improvements in Apparatus for Extracting Fat and Glue from Bones. G. W. von Nawrocki, Berlin. A Communication from J. Wellstein, of Bamberg, Bavaria. Eng. Pat. 5841, November 25, 1884.

THIS is a description, with figure, of a well-devised and complete arrangement for the treatment of bones in the same extracting vessel: (1) with a solvent such as benzene for the extraction of all fat, the solvent being of course recovered by distillation and used several times in succession; (2) with a weak solution of oxalic or hydrochloric acids, for a greater or less time and under more or less pressure according to the age of the bones; (3) with hot water for the extraction of the glue. A special feature claimed is a perforated coil or rose in the top of the extractor employed in conjunction with an injector below, the effect of which is to draw off the solvent from below and flush the bones with it from above. Details are also given of certain special modes of connecting the extractor with the condenser, the solvent-store and the still in which the solvent is vaporised.—W. L. C.

The Manufacture of Rosin Soap. John Imray, London. A Communication from H. J. E. Hennebuth, of France. Eng. Pat. 5154, December 9, 1884.

PRIOR to saponification, powdered rosin is to be treated with sulphurous or sulphuric acids, or with a weak solution of sulphate of alumina. The soap may be used either alone or mixed with a fat soap or with silicate of soda.—W. L. C.

XII.—PAINTS, VARNISHES, Etc.

On Iron Paint. Ding. Polyt. Journ. 255 [1], 48.

THE Dutch Railway Company have tried a series of experiments on the various pigments used for coating iron and their best method of application. They find that red lead is better than any of the oxides of iron used, and that the paint is more satisfactory when the metal has been previously cleaned with hydrochloric acid than when it has only been cleaned by friction. The Cincinnati Southern Railway Company also find that red lead is the best for their iron bridges.—S. R.

The Preparation of Brilliant-lac. Dingl. Polyt. Journ. 255 [1], 48.

To obtain lac of different colours, coal-tar dyes are dissolved in spirit, the concentrated solution is allowed to stand for a week or two in a dark and cool place and then filtered. The clear solution is then added to the shellac till the required colour is obtained.—S. R.

Apparatus for Manufacturing White Lead. J. Kay, Bury. Eng. Pat. 727, January 5, 1884.

THE wicket lead is placed on an endless belt and carried to breaker, or crushing mill, which consists preferably of three pairs of horizontal rollers, placed vertically over each other. The crushed lead is passed through an inclined revolving screen, the interior of which is studded with pegs to prevent the blue lead from passing through too rapidly. The white lead drops through the perforations of the screen into the hopper of a grinding machine. This consists by preference of three pairs of horizontal rollers placed vertically over each other, each roller sliding horizontally in the contrary direction to its fellow, so as to increase the grinding power and to keep the rollers true.

—J. T.

Improvements in Paints. F. Wirth, Frankfort-on-the-Main. Communicated by O. Fischer, Karlsruhe, Germany. Eng. Pat. 2539, February 1, 1884.

THE following mixture is recommended as a body colour to be laid on previous to the oil colour, and which by admixture with further materials is applicable as a substitute for linseed oil: 100 parts of blood, 10 parts of scalded linseed, 190 parts of water, and 10 parts of potassium chromate. Applied as a substitute for linseed oil in mixing colours, this preparation is treated in the proportion of 275 parts with a compound consisting of 75 parts of petroleum, 20 parts of linseed oil, 1 part of pyrolusite, 1 part of hydrochloric acid, and 3 parts of resin. To combine this compound with the first mixture, 2 parts of soap dissolved in 23 parts of water are added.—D. B.

White Lead Manufacture. H. G. Blyth, London. Eng. Pat. 10,375, July 19, 1884.

OXIDE of lead, obtained by the cupellation of impure Spanish lead, or by heating impure carbonates, both mineral and artificial, are employed. When there is much calcareous matter present this crude oxide cannot be advantageously employed. The oxide is placed on a false bottom of porous material in a vessel and treated with solution of lead acetate, an old and well-known process. The solution from beneath the false bottom is run into a second tank and permeated with carbonic acid gas. By a process of upward filtration the liquid overflows from the lower tank, and is pumped back to the upper one. When the bottom part of the lower tank is full of precipitated carbonate it is lowered away from the upper portion, turned over on trunnions and emptied.

—J. T.

Apparatus for the Production of White Lead. Dingl. Polyt. Journ. 254 [12], 489.

IN order to granulate lead for white lead making, J. C. Martin, of Richmond, England (D.R.P., No. 28,322, of August 31, 1883), lets it fall on a rotating cylinder, from which any adhering lead is removed by scrapers. Graphite or steatite may also be used to lessen the adhesion. The pellets of lead fall from the cylinder A (Fig. 1) upon a movable platform or belt, formed of two endless chains *a*, carrying lathes *m*, keeping the chains at a suitable distance from each other, the whole working over two cylinders *v*. This lead, on falling into the water, is removed on the endless belt *m* and deposited outside the trough. The manufactured white lead is dried in a series of closed cylinders A (Fig. 2), each of which contains a worm *s* formed of copper bands to impel the white lead forwards. The supply funnel *t* leads to a cylindrical chamber, in which a shaft *o* revolves slowly, carrying arms covered with leather which conducts the supply of white lead gradually to the drying chambers. The cylindrical chamber *k* represents an enlarged continuation of the cylinders A, and contains a paddle-wheel *r* fixed to the shaft *w*. The paddles *a* are so placed that by revolving in the direction of the arrow the white lead is removed from the chamber *k* into the end of the second trough. When the white lead arrives at the end of the first cylinder, it falls into the chamber *k* through the opening *x* in the sides of the wheel *r* and through the spaces between the paddles *a*, so that by the continued motion of the paddle-wheel the white lead is carried up on the inner circumference of the chamber *k* until it falls through the opening *u* into the next trough A. Here the white lead receives motion in an opposite direction by the worm *s*, and finally leaves the apparatus at the opening N of the last trough. The hot air used for drying enters through a conduit above, on one side of the cylinder, and escapes on the other side through a pipe *z*. The washing apparatus, for separating white lead from unattacked metal, of H. Kirberg, of Hilden, near Düsseldorf (D.R.P., No. 28,528, of January 9, 1884), claims to be more efficient and less liable *to get out of order than the one invented by Horn.*

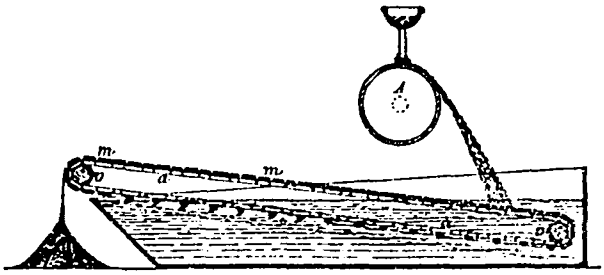


Fig. 1.

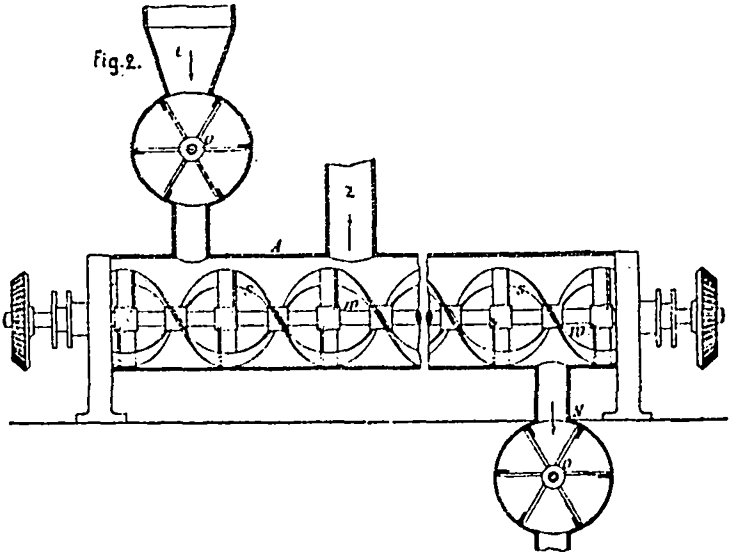


Fig. 2.

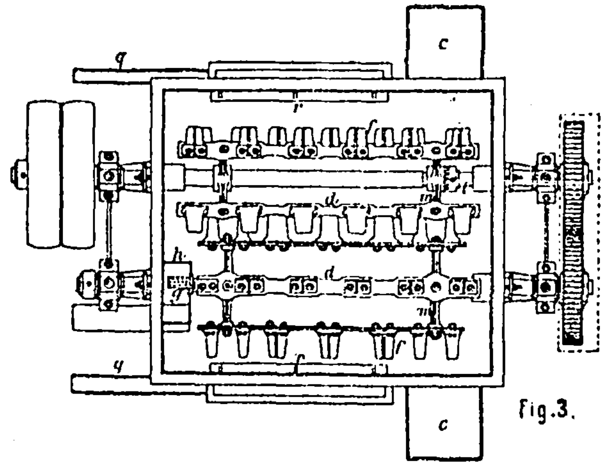


Fig. 3.

As will be seen by reference to Fig. 4, the copper vat *b* completely closed with a wooden cover and fastened to the cast-iron supports *a*, is fed with the mass of oxide to be operated on, and also with the necessary washing liquid through the funnels C (Fig. 3) fixed to the vat. The two reels *d*, turning in opposite directions by means of toothed wheels driven by pulleys and provided with beaters *f* screwed on to the beams *c* (Fig. 4), effect a thorough agitation and thereby a rapid separation of the mass of oxide into its constituents. The perforated tray-shaped discharging scoop *g*, which takes up the particles of lead freed from oxide from the bottom of the vat and throws them into the funnel *h*, is movable on its *upper portion round a peg* attached to an arm *i*, whereby it can be set forwards or backwards according to the required amount of discharge by means of a screw *arranged underneath. In order to effect a slow or quick* washing of hard, or in the other case of soft, oxide the coupling *l* is opened, by which the cross-piece *m* running loose on the axle can be turned a little, whilst the second cross-piece remains *fixed*, and in this way the beams *c* and the surfaces of the beaters are brought to an inclination with the axis of the apparatus, whereby the rapidity of the motion of the mass towards the place of exit is regulated. After the required displacement of the beams *c* (Fig. 5), the coupling *l* is again closed, and by screwing tight is ensured against becoming loose again. The water, charged with lead oxide, flows through the sieve *o* situated at the surface of the liquid into the long box closed with a lid and through the trough *q* into the settling vat. The protecting screen *r* which, hanging from the sieve *o* and leaving an opening underneath, and is easy to remove for cleaning, prevents the entrance of small metallic particles of lead into the sieve, whilst the direction of motion of the mass of oxide, and therewith also of any accompanying particles of metal, tends downwards on the side walls of the apparatus.—C. H. B.

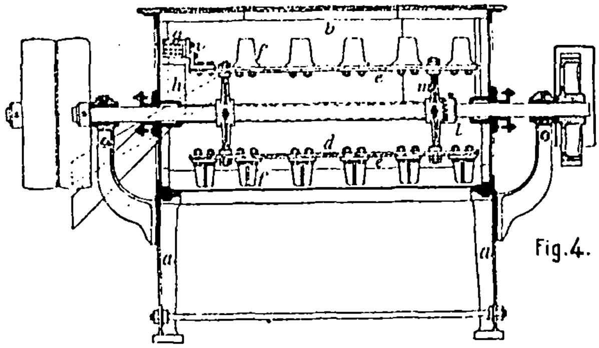


Fig. 4.

XIII.—TANNING, LEATHER, GLUES, SIZES, AND RESINS.

Improvement in Tanning. Frank Werth. Eng. Pat. 1857, January 21, 1884.

This covers the use of dried peat moss made into bricks or mixed with vegetable tanning materials rich in tannin, and also with mineral tanning substances, such as alum, salt, and chromate of potash.—H. R. P.

Improvements in Apparatus for Tanning Hides and Skins. Ambrose Myall, London. Eng. Pat. 3174, February 12, 1884.

Two or more laticed tanning drums of the ordinary description are placed in a circular vat provided with a vertical shaft in the centre, by means of which the drums are made to rotate round the vat, at the same time turning on their axes with a rolling motion. The vat is supplied with liquor by a centrifugal pump, from a series of tanks in which it is filtered and settled. The patentee also claims the ordinary form of tanning drum which has been in use in English and American tanneries for more than 20 years.—H. R. P.

Improvements in Machines for the Manufacture of Leather. Ambrose Myall, London. Eng. Pat. 3374, February 15, 1884.

The subject of this patent is a machine identical in construction with the Priestman striking machine generally used in finishing offal; the use of serrated blades for fleshing and unhairing; and the drum is to be covered with pumice, emery paper, or cloth, for various other operations, such as rolling, whitening, and polishing.
—H. R. P.

Improvements in Waterproofing Leather. Wm. J. Gale. Eng. Pat. 4826, March 13, 1884.

The leather, after washing with warm water, or with weak solution of soda or other alkali, is exposed to the fumes of ammoniacal gas, and then slowly dried in a closed chamber.—H. R. P.

Improvements in the Treatment of Leather. James Paterson. Eng. Pat. 6756, April 24, 1884.

Leather intended for belts, hose pipes, etc., either curried or rough dried, is soaked in a solution of wood-resin and gum thus (frankincense), melted together, dissolved by heat in linseed oil, and afterwards mixed with petroleum, benzolene, or bisulphide of carbon, and a small quantity of India-rubber solution. When thoroughly saturated, the leather is washed in a bath of petroleum-benzolene, and dried on racks or otherwise. The tendency of the leather to stretch is said to be materially lessened.
—H. R. P.

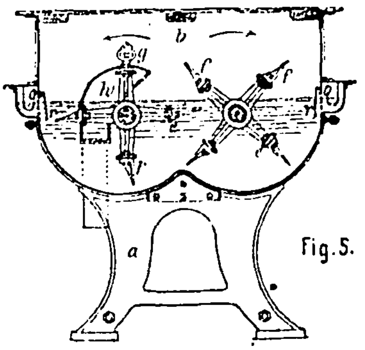


Fig. 5.

Improvements in the Process for Tanning Tawed Leather. Caeser Kaestner, Magdeburg. Eng. Pat. 11,442, August 19, 1884.

Alumed leather is tanned with a solution of tannin in alcohol instead of water, by which the leather is completely tanned in eight days. Tannin, catechu, and picric acid are mentioned as suitable materials.—H. R. P.

XIV.—AGRICULTURE, MANURES, Etc.

On the Preparation of Phosphates. Dingl. Polyt. Journ. 255 [1], 35.

Dreyfus obtains phosphoric acid from mineral phosphates by treating them with sulphuric acid in leaden vessels. The gypsum formed is removed by a filter-press, and the solution of phosphoric acid concentrated by causing a flame to play upon the surface of the liquid, which is placed in a leaden pan over an open fire. The pan rests on a bed of sand, and is surrounded by a wall of stone. In an oven 5 or 6 metres long, and 1·5 wide, 8000kilos. of phosphoric acid can be concentrated. A less advantageous method is to concentrate the solution in wooden vessels lined with lead, by means of superheated steam under 3 or 4 atmospheres. The precipitate consists mainly of gypsum, undecomposed oxides of iron and alumina, and from 2 to 3 per cent. of combined phosphoric acid. It is used as a manure under the name of *phosphate-gypsum*. The phosphoric acid can be mixed with powdered phosphates to form super-phosphates containing 43 to 44 per cent of soluble phosphoric acid, or can be used for the preparation of precipitated phosphate of lime. Adair and Thomlinson (D.R.P., Class 16, No. 28,739, August 12, 1883) obtain the phosphoric acid out of slags and minerals, by first reducing to a fine powder, then roasting if carbonic acid or calcium phosphate is present, and finally decomposing with strong caustic soda in the proportion of three equivalents of soda to one of phosphoric acid. The mixture is strongly heated in iron vessels, and the solution of phosphate of soda filtered or decanted from the precipitate. The solution when concentrated can be purified from silica, alumina, manganese or iron, by passing through it a current of air and carbonic acid. The precipitate is separated, and calcium phosphate thrown down from the solution by the addition of milk of lime. If a basic slag or iron ores containing phosphorus is being used, a mixture of potassium and sodium carbonate solutions is employed instead of the caustic alkali. Caustic ammonia or ammonium carbonate solution can be employed in the same way in closed vessels. The ammonium phosphate can be crystallised from the solution, or calcium phosphate can be prepared as previously by precipitation with milk of lime.—S. R.

On the Preservation of Frozen Potatoes. Dingl. Polyt. Journ. 255 [1], 45.

FITTBOGEN has examined frost-damaged potatoes which had been stored in silos, and finds that they lose their value as a food stuff very rapidly. He analysed the ensilage after 50, 76, and 140 days, and found that the loss of fat increased from 57·1 per cent. after 50 days, to 87·0 per cent. after 140 days. A corresponding loss in the amount of starches and albuminoid substances was also noticed. This method of preservation is not to be recommended.—S. R.

Value of Cockchafers as a Manure. Dingl. Polyt. Journ. 255 [1], 46.

F. A. WOLF kills the chafers by enclosing them in a vessel with carbon-bisulphide. After ten or twenty minutes they are dead, and can be then heated to 60° in a kiln for five hours; they lose in this way about 65 per cent. of their weight, but when dried can be kept for any length of time. The product contains 12 per cent. of nitrogen, 1·2 per cent. of phosphoric acid, and 1·2 per cent. of potassium. The organic matter consists of 38 per cent. of albuminoids, and 10 per cent. of fats.—S. R.

On the Employment of Artificial Manure in Potato Culture. S. Guradze. Biedermann's Cent.-Blatt. 1883, 6, 377.

THE author made experiments with Chili saltpetre, superphosphate and patent "potash-magnesia." The tabulated results are as follow :—

Field.	Manure per Acre.				Cost of Manure.	Yield per Acre, ctr.	Starch %.	Starch per Acre, kg.
	Stable Manure, ctr.	Superphosphate (20% P.), kg.	Chili Saltpetre (16% N.), kg.	Patent Potash-Magnesia, kg.				
I.	90	—	—	—	—	63·0	11·0	411
	90	30	25	—	12·30	76·2	15·1	587
II.	90	—	—	—	—	72·2	15·1	515
	90	—	—	25	3·20	81·7	15·8	669
	90	25	—	25	7·20	81·3	16·0	671
	90	25	25	32	11·90	88·1	16·1	727
III.	—	37·5	37·5	—	17·25	93·0	13·9	616
	—	—	—	—	—	86·0	13·5	581
IV.	90	—	—	—	—	92,0	11·7	670
	90	25	—	—	4·00	101·6	11·9	779
	90	—	25	—	7·50	119·0	15·1	898
	90	25	25	—	11·50	128·2	15·6	999
V.	80	—	—	—	—	82·0	16·6	681
	80	35	—	—	5·60	85·2	15·1	656
	80	35	35	—	16·10	86·0	16·0	688
	80	35	35	50	22·50	96·3	15·5	710

The soil of Nos. I. and II. fields was a loamy sand; that of No. III., loam; No. IV., loamy sand to sandy loam, and pure loam of the muschelkalk formation; and No. V., warm loamy sand.—E. G. C.

On the Manurial Value of the Deposit from Urban Refuse-Water. M. Fleischerem. Biedermann's Cent. Blatt. 1883, 6, 426.

IN Bremen, the waste-water from houses and manufactories, together with large quantities of urine, is conducted by channels into a river with a sluggish current. The deposit formed in the river bed has been examined by the author, who finds it to possess an acid reaction, and to contain hydrated ferrous-oxide. On ignition in a platinum dish, sulphurous acid is given off. One thousand parts of this material contain—

	Dry.	With 45 per cent. water.
Potash	6·3	3·5
Lime	17·2	9·5
Phosphoric acid	8·0	4·4
Total nitrogen	11·6	6·4

By exposure to the atmosphere and consequent loss of water, the fixed constituents could be brought to from 50-60 per cent., and 25 centners would then be worth 18 marks, and contain 4·4kg. potash, 12kg. lime, 5·5kg. phosphoric acid, and 7·0kg. nitrogen. The material must be exposed to the air for some time before being applied to the soil, because of its richness in sulphur compounds. The sulphuric acid, resulting from the oxidation of the metallic sulphides, would be advantageously neutralised by an admixture of calcareous matter. Another example of deposit from a pond, with which the refuse matter of a portion of the town had been conducted for a long period, furnished the following figures :—

	As collected.	Dried at 100 degrees.
Water	889·7	—
Combustible matter	27·2	251·0
Nitrogen therein	1·46	13·2
Insoluble in HCl	52·25	498·8
Potash	0·98	8·9
Soda	0·34	3·1
Lime	1·91	17·3
Magnesia	1·35	12·2
Ferric and aluminic oxides	18·25	165·5
Phosphoric acid	0·52	4·7
Sulphuric acid	3·65	33·1

This sample, as collected, had an acid reaction, and evolved much sulphuretted hydrogen on the addition of HCl. With a proportion of 45 per cent. of water, 25 centners of this material would represent a value of about 10·4 marks.—E. G. C.

On the Employment of Basic Phosphate of Lime as an Addition to Fodder. Dr. Cohn. Biedermann's Cent.-Blatt. 1883, 6, 428.

The author, after referring to the writings of Lehmann, Gohren, and Schieweck, who state that calves, bullocks, sheep, and swine assimilate calcic basic phosphate, recommends this compound as being a wholesome addition to cattle food. To lambs and young pigs 8-12 grm. per head and day should be given, to calves and foals 12-20grm., and to cows and bullocks 20-25grm.

—E. G. C.

Remarkable Influence of Manuring on the Composition of Potatoes. Professor M. Märcker, Graeger and Vibrans-Calvörde. Biedermann's Cent.-Blatt. 1883, 6, 365.

The experiments were carried out on a good soil of sandy loam, which in the previous year had yielded barley and clover. The manure used contained 20lb. of soluble phosphoric acid per acre, together with varying quantities of Chili saltpetre. Certain plots were left unmanured. The yield of potatoes was greater on the manured plots than on the unmanured, but it was found that manuring with considerable quantities of Chili saltpetre had had the effect of considerably diminishing the percentages of dry substance and starch (the latter by as much as 6 per cent.). The albumen and other nitrogenous constituents were, however, augmented.—E. G. C.

The Manuring of Beet-Roots. Dr. Holdefleiss. Biedermann's Cent.-Blatt. 1883, 6, 380.

As the result of his experiments, the author concludes that a moderate quantity only of stable manure, together with Chili saltpetre, should be used; also that manure too rich in nitrogen has a pernicious influence; and finally, that in the absence of stable manure, the addition of Chili saltpetre and superphosphate simultaneously is to be recommended.—E. G. C.

A New Material for the Manufacture of Peat Manure and on the value of this kind of Manure. M. Fleischer, C. Spierling, and others. Biedermann's Cent.-Blatt. 1883, 6, 368.

Hitherto moss-peat from the North German moors has been chiefly used; the principal characteristics of this peat are its affinity for moisture, its elasticity and softness, even when dried, its property of absorbing ammonia and carbonate of ammonia from refuse animal matters, and its high proportion of nitrogen as compared with other similar materials. It is now proposed to employ a fibrous peat from Schleswig and Würtemburg, consisting chiefly of *phragmites communis*. One hundred parts of the air-dried Würtemburg peat (containing 20 per cent. of water) were found to absorb and hold 933 parts of water, while 100 parts of the Schleswig peat took up and held 630 parts of water; 1000 parts of Würtemburg peat absorbed 16·8 parts of nitrogen in the form of ammonia, and 1000 parts of Schleswig peat absorbed 13·0 parts; 1000 parts of the ordinary North German moss-peat absorbed 17 parts of ammoniacal nitrogen. A comparison of the three kinds of peat, as regards their constituents, yielded the following results in 1000 parts of completely dried material:—

	Wurtemburg fibrous peat.	Schleswig fibrous peat.	North-West German moss peat.
Nitrogen	....about 22 parts.	29 parts	9 parts.
Phosphoric acid..	0·6 „	0·6 „	0·1 „
Lime	..............17·2 „	31·0 „	2·0 „

It is evident from these figures that both the Würtemburg and Schleswig peats are considerably richer in nutritive constituents than the moss-peat. Experiments made by several observers as to the efficacy of manures, consisting of admixtures of peat with other substances, such as Chili saltpetre, bone-meal, stable manure, etc., have yielded decidedly satisfactory results.—E. G. C.

The Behaviour of Legumin with Solutions of Common Salt. H. Ritthausen. Biedermann's Cent.-Blatt. 1883, 6, 398.

Th. Weyl discovered that leguminous seeds contain proteïd bodies soluble in a solution of salt. The author made some legumin preparations by extraction with aqueous potash and precipitation with acetic acid, and found them to be for the most part insoluble in salt water. The salt water solutions, however, gave when highly diluted considerable precipitates, which after washing with alcohol and drying over sulphuric acid, formed white, shining, brittle masses. Legumin from pease furnished 20·6 - 26·2 per cent. of proteïd matter soluble in salt water; that from broad beans, 18·8 and 28·8 per cent; legumin from vetches, 23 per cent.; and that from chick-pease (*Lathyrus*), 24·8 per cent. The composition of the soluble matter (calculated on the material free from mineral matter) was as follows:—

	From the legumin of pease.	From the legumin of broad beans.
C	51·62	50·93
H	6·96	6·95
N	18·26	17·91
S	0·33	0·27
O	22·83	23·94

The compounds of tannic acid with albuminoid bodies are completely insoluble in salt water, and as the occurrence of tannic acid in the shells of beans, pease, etc., is very frequent, it is necessary in preparing the proteïd substance from seeds to first remove the shells. The incomplete solution in salt water of the legumin present in seeds proves that the latter is a mixture of several proteïd bodies. The constituent of pease, soluble in salt water, does not differ essentially in composition from the body extracted by the aid of aqueous potash, and is very similar to the conglutin of lupines, although not identical with it, as the following figures will show:—

		Conglutin.
C	51·62	50·16
H	6·96	7·03
N	18·26	18·67
S	0·33	1·07
O	22·83	23·07

—E. G. C.

On the Influence of the Electric Light on the Development of Plants. P. P. Dehérain. Biedermann's Cent.-Blatt. 1883, 6, 408.

The author's experiments were made with plants continuously exposed for many days and nights to the rays of the electric light, which in some cases were allowed to fall directly upon the plants and in others were caused to pass through the sides of transparent glass globes. Experiments in this direction had been previously made by Siemens, but not for such extended periods. The effects of the naked rays noted by Dehérain were very curious; some of the plants lost their leaves, some became spotted, weak and unhealthy, others turned black, while in the case of some elder shrubs, leaves directly exposed to the electric rays were blackened, although the more protected leaves retained their green colour. The outlines of the upper leaves were found in many instances depicted on those underneath with the distinctness of photography. The influence on vegetation of electric rays which had passed through transparent glass globes was not so prejudicial, although complete development was greatly interfered with. The following conclusions were arrived at by the author: (1) the electric light contains rays which are injurious to vegetation; (2) the greater part of these rays are kept back by transparent glass; (3) the electric light contains, on the other hand, sufficient rays useful to vegetation to maintain the life of plants entirely under its influence for 2½ months; (4) this amount of useful rays is, however, insufficient to bring on young germinating plants or to bring full-grown plants to maturity.—E. G. C.

Defects in the Present Method of Butter-making. Otto Biedermann's Cent.-Blatt. 1883, 6, 417.

The author calls attention to several imperfections in the production and working of milk for butter-making. The animals yielding the milk should be rationally fed; for example, the food given to them must not contain a disproportionately large amount of any one ingredient, to the exclusion of others. Then, again, the milk yielded by old milch-kine is slightly bitter and furnishes bitter butter; too much of such milk should therefore be avoided. Particular care must be taken that the air of the cowhouse be as pure and sweet as possible, and that no milk be allowed to remain there for a longer time than is absolutely necessary. The churn also should be in an airy and well-ventilated position, and all vessels used must be cleansed with the most scrupulous care. Neglect of any of these points involves a risk of the production of butter unsatisfactory in quality and in taste.—E. G. C.

Improvements in the Treatment with Sanitary Objects of Human Excreta and other Putrescible Matter; and in Apparatus and Means employed in the Conversion of the same for Manurial Purposes. Richard Nicholls, Hendon. Eng. Pat. 94, January 1, 1884.

THE fæcal matter is to be received in a vessel provided a removable air-tight hollow cover, charged with soot or other carbonaceous material, which falls upon and deodorises the excreta when the cover is re-placed by a person using the apparatus. The receptacle is constructed so as to be readily portable, and is adapted for being heated over a stove, with the object of partially or wholly driving off the moisture from the contents, which, after this firing process, are of high value for manurial purposes.—E. G. C.

Treatment and Disposal of Sewage. Fritz Hille, Chiswick. Eng. Pat. 1279, January 11, 1884.

THIS invention consists essentially in treating sewage with magnesium, calcium, ferric, or other chloride, or with calcium oxychloride, or with alum followed by lime-water; the effluent water so produced being sufficiently purified for discharge into rivers or the sea. Where particularly strong and offensive sewage has to be dealt with, a small quantity of diluted carbolic acid may be added with advantage. The sewage deposit may be dried, crushed, and compounded with kainite, or with phosphate of lime, and profitably disposed of as artificial manure.—E. G. C.

Treatment of Sewage. J. B. Mills, Southampton Buildings, London, W.C. Communicated by Jean Marie Guénantin, Rue d'Hautville, Paris. Eng. Pat. 2568, February 1, 1884.

A SPECIAL re-agent is prepared by dissolving 4 parts bauxite in 50 parts hydrochloric acid by the aid of a jet of steam, and adding 30 parts phosphate of lime. This re-agent is mixed with the solid or sludge matters of excreta or sewage in closed vessels, and the mixture is dried, filter-pressed, and ground, forming a manure containing 3-4 per cent. nitrogen, and 8-12 per cent. assimilable phosphoric acid. The liquid portion of the matter to be dealt with is heated, mixed with lime, and the ammonia distilled off, all in a special arrangement of apparatus claimed by the inventor. The heated liquor, deprived of ammonia, is cooled by traversing a circulatory apparatus containing fresh liquor from which the ammonia has to be extracted. Various detailed processes are claimed, and a drawing is given of a complete arrangement of vats, precipitating tanks, heaters, stills, etc., for dealing with the excreta of a town.—J. M. H. M.

Dissolving Leather for use as Manure. By William Martin, Wadebridge, Cornwall. Eng. Pat. 3493, February 18, 1884.

LEATHER chips or shavings are mixed with potash, soda, lime, or other alkali, and heated by steam at 20 to 40lb. pressure, for 20 to 60 minutes, then dried and ground.
—J. M. H. M.

Recovering Nitrogenous Matters from Certain Deposits. J. C. W. Stanley, 41, Barnsdale Road, Middlesex. Eng. Pat. 1843, February 21, 1884.

RIVER mud collected in the vicinity of sewage outfalls contains a considerable proportion of nitrogen. Mud dredged from the still waters of the London Docks contains, according to the inventor, ·47 per cent. N. The inventor proposes to dredge up river mud, dry it, and submit it to destructive distillation in order to recover this nitrogen in the form of ammonia.—J. M. H. M.

Making Sewage Refuse into Manure. F. G. Redman and J. Butt, Peterborough. Eng. Pat. 3996, February 27, 1884.

IN the process patented for the conversion of sewage into manure, solid sewage refuse is treated with lime and sulphuric acid, employing for a ton of refuse 5 to 10cwt. or even a ton of the former and a carboy (about 60lb.) of the latter; several superincumbent layers are constructed in the order—sewage, lime, sprinklings of acid, finishing with a final covering of sewage. The resulting mass is mixed, for every ton of sewage employed, with 14lb. ammonium sulphate, 14lb. to 28lb. each of potash and kainite, and, if desired, 14lb. sodium nitrate; these quantities are, however, regulated according to the quality of manure required, and the introduction of the last ingredient is quite optional.—D. A. L.

Mill for Grinding Phosphates and other Materials. Isaac Brown, India Buildings, Edinburgh. Eng. Pat. 9457, June 26, 1884.

A HOLLOW drum is driven at a high speed and the material to be ground is fed into it through the trunnions. In contact with the inside surface of the rim of this drum are small rollers which effect the grinding. The rim may be perforated or reticulated. A drawing is annexed to the specification.—J. M. H. M.

An Improved Method of Purifying or Disinfecting Sewage, and of Collecting the Ammonia, etc., contained therein, for Manurial Purposes. S. D. Cox, New Charlton. Eng. Pat. 12,345, September 12, 1884.

ACCORDING to this invention, sewage is conducted from the sewers by means of pumps into a tank provided with several rows of plates or walls so arranged as to break or interrupt the flow of the sewage through, and to cause the greater part of the insoluble or heavy matter to become deposited at the bottom of the tank. The liquid portion is then allowed to flow over into a second tank containing a number of strainers or frames filled with peat or other suitable material. These strainers permit the liquid sewage to pass through them very rapidly, becoming, in its course, so purified that it passes from the second into the third tank in a comparatively clear condition. The third tank possesses a perforated false-bottom, on which is a layer or filter-bed of coarse peat-charcoal covered by another layer or bed of powdered or granular charcoal. These beds are about 6in. thick and provided with a perforated iron cover. After passing through these filter-beds the liquid will be bright and clear, and may be allowed to flow into a river or elsewhere.
—E. G. C.

XV.—SUGAR, GUMS, STARCHES, Etc.

On the Formation of Sugar in Roots. Dingl. Polyt. Journ. 255 [1], 46.

GIRARD, in the *Comptes Rendus*, 1884, 99,808, has shown that saccharose is formed in the leaves of sugar-beets by the action of light and then passes into the roots. The proportion of saccharose to glucose is always much greater in the daytime than at night, sometimes being as great as four times as much. The formation of saccharose takes place in the leaves even when severed from the plant.—S. R.

Working up Diffusion Residues from Sugar. Dingl. Polyt. Journ. 255 [3], 127.

IN order to remove water as much as possible from the colloid matter in the cuttings, M. Maerker, of Halle

(Germ. Pat. No. 29,640, March 2, 1884), adds lime. Either caustic lime, slack or quick, powdered lime, or milk of lime may be used, also carbonate of lime. The addition of lime may take place without warming or the mixture may be warmed. It is stated that pressed cuttings containing 10·9 per cent. dry matter, when treated with ·5 per cent. of lime were, by a second pressing equal to a few atmoshperes, converted into a mass containing 25 to 30 per cent. of dry matter. The same pressure applied to cuttings not treated with lime gave only 15·6 per cent. dry matter. The addition of lime can take place in the presses or in the diffusers. No considerable removal of nutritious matter from the cuttings is observed, and owing to the small amount of lime added the dry matter contains but a small percentage more lime, which is not injurious and indeed rather beneficial as regards keeping properties and action of the cuttings as food for cattle; also the press-waters are removed in a much purer condition. Besides, by means of lime and carbonated and caustic alkalies, the introduction of osmose processes causes a large proportion of the water, which is tenaciously retained by diffusion residues, to become removable, and for this purpose common salt or other easily soluble salts of alkalies and alkaline earths may be employed. This process is applicable to the removal of water from other sugar residues, also from the residues of distilleries, starch manufactories and breweries, which are used for feeding cattle. Further, it may be employed for removing water from very damp materials used for fuels such as tanner's waste and especially turf.—H. A. R.

New Apparatus for the Manufacture of Sugar.

Dingl. Polyt. Journ. 255, 202.

For estimating the soil on beets and potatoes, P. Reus (Germ. Pat. 25,755, April 3, 1883) employs (Figs. 1 and 2) a trough *d*, which can be raised and lowered on the cast-iron stand *a* by means of the lever *f*. The beam *b* carries at one end a weight pan, and at the other a washing drum, which dips into the trough *d*. The roots are placed in the drum, their weight determined, then the trough is raised, and by turning the handle of the drum the roots are washed. After lowering the trough and letting the water drain off they are weighed again, and the loss in weight corresponds to the amount of adhering soil.

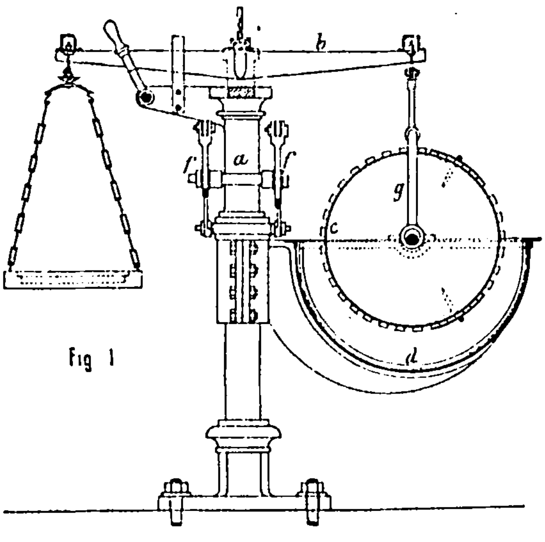


Fig 1

P. Suckow & Co., Breslau (Germ. Pat. 25,207, February 27, 1883), have devised a mill for preparing beets for analysis (Figs. 3 and 4). The roughly cut roots are thrown into the box *a*. Motion is imparted to the millstone *d* by the shaft *c* and the bevelled wheels *f*. The stone rotates in the cylindrical part of the case *h*, which is provided with teeth on the inside. On this two spur wheels work, and effect a complete grinding and crushing of the beet chips. When the chips are properly prepared they fall into the space *r*, in which they are reduced to the desired thin pulp, which is removed at *i* by a scraper. The space *r* can be adjusted by turning the screw *b*. A scraper R rotates with the shaft *n*.

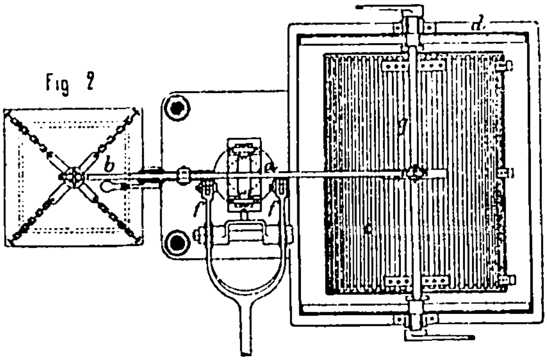


Fig 2

O. Licht, Sudenburg (Germ. Pat. 25,062, March 13, 1883), in order to facilitate the solution of sulphurous or carbonic acid during saturation of the beet juice, attaches movable sieves *a* of metal or wickerwork to the inside of the vessel at *b* (Fig. 5), so that by means of the rods *d* they can be fixed in such positions as to give the desired resistance.

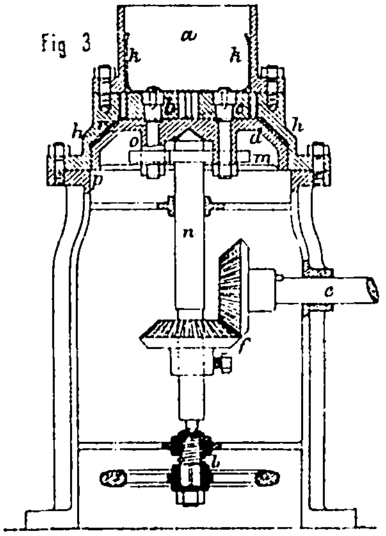


Fig 3

The juice filter of A. Vibraus (Germ. Pat. 27,362, June 21, 1883) is made of perforated sheet iron, and covered with a suitable filter cloth, so that the liquid contained in the vessel *a* (Fig. 6) passes from the out to the inside, and flows off by the pipe *d*, which can be readily removed by loosening the intermediate piece *c* when it is necessary to clean the filter.

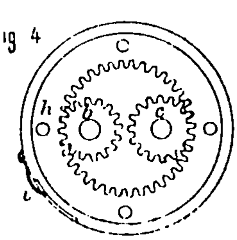


Fig 4

In the juice filter of O. Licht (Germ. Pat. 27,364, October 24, 1883), the liquid enters by the funnel-shaped pipe B (Fig. 7), falls on the distributor C, and thus on to the filtering material, which rests on the false bottom *s*. The filtrate passes through the pipes *a*, *b*, and *d* into the receiver L. The pipe *c* serves to discharge completely the liquid from the filtering chamber F, while the pipe *e* prevents the vessel from becoming empty during the operation. The pipes *f*, *g*, *h*, *i*, *k*, connected with the common air pipe *m*, serve to regulate the suction height of the column of liquid flowing away, according to the resistance offered by the filter to the passage of the juice. The pipe *n*, used for washing the sweet out of the filtering medium, opens into the overflow pipe O, which is connected with the vessel M. The filter is charged with juice by the pipe B, and the cocks *c* and *f* are opened; at first it works simply by the pressure corresponding to the difference in the level between the liquid in F and *d*, when the rate of flow diminishes owing to the filter becoming choked, the cock *f* is shut and *g* opened, whereby the outflow increases again. This is repeated from time to time with the other cocks. By increasing the length of the suction pipe *d* almost any resistance in the filter may be overcome; when the filter is exhausted the cock *c* is opened, and the last portion of the juice allowed to flow out.

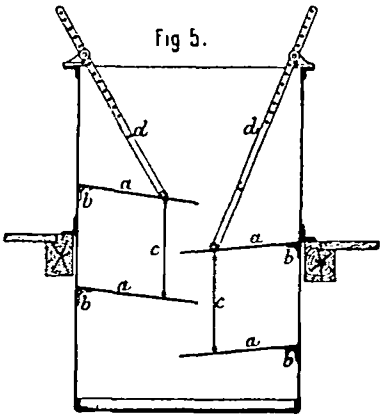


Fig 5.

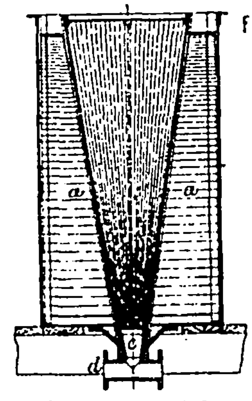


Fig 6

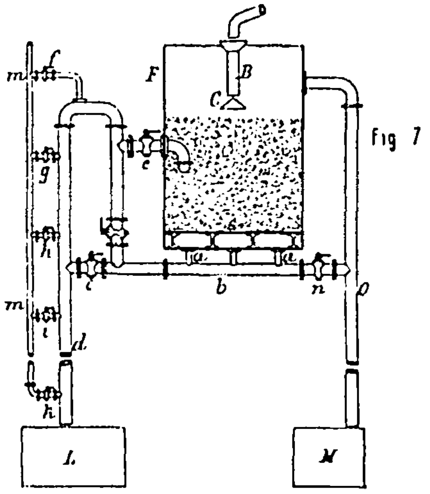


Fig 7

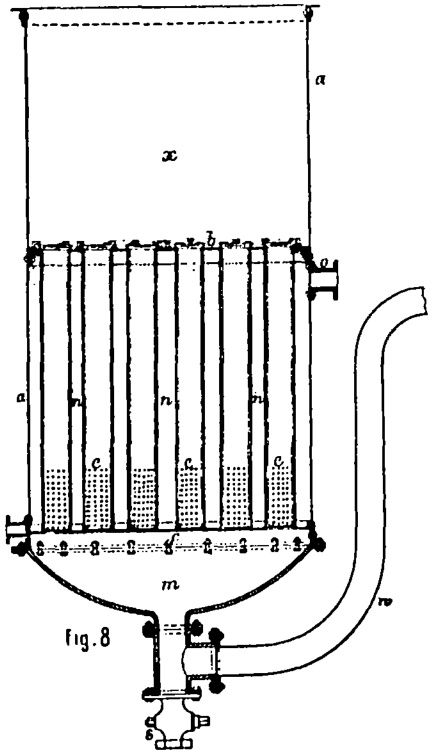


Fig. 8

The bag filter of Th. Otto (Germ. Pat. 29,026, January 22, 1884) consists, as will be seen from Fig. 8, of a cylindrical vessel *a*, with two perforated plates *b* and *c*, in which are fixed the pipes *n*. Other pipes, perforated at the lower end, in which filter bags are hung, are placed inside the first pipes. The bags are filled with coarse charcoal or sand, and the juice contained in the space *x* flows through the bags and collects in *m*, and is conducted away by the pipe *w*. The apparatus is heated by waste steam, which enters at *o* and surrounds the pipes.

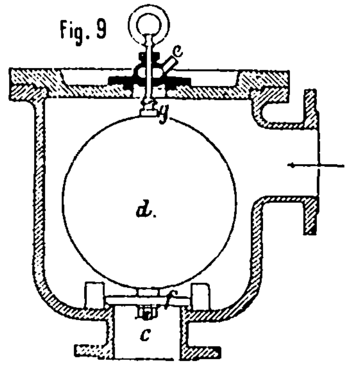


Fig. 9

In order to prevent the steam from passing from the montejus into the filter presses, E. Schulze (Germ. Pat. 29,014, March 30, 1884) employs a vessel which communicates with the filter presses by the pipe C (Fig. 9), and contains a float *a*, to which the valve *f* is attached. The apparatus is started by raising the float by means of the handle, when the vessel containing it becomes filled with the liquid to be filtered; after all the liquid has passed the float falls, shutting the valve *f* and preventing the steam from entering the presses, and opening the valve *g*, by which the steam escapes.

Figs. 10 and 11 show an apparatus (G. Bokelberg, Germ. Pat. 28,661, March 11, 1884) for drying beet roots as they come from the washing machine. They are discharged into the drying apparatus, and fall on the sieve surfaces *s*, and finally discharge themselves at C into a wagon. The water adhering to the roots passes through the sieves and collects on the inclined plates *v*, and flows away by the pipes *r*. A blast of warm air passing up the apparatus completes the drying of the roots. The small doors *c* are to be used in the event of any stoppage occurring in the drying apparatus, or for cleaning the shelves.

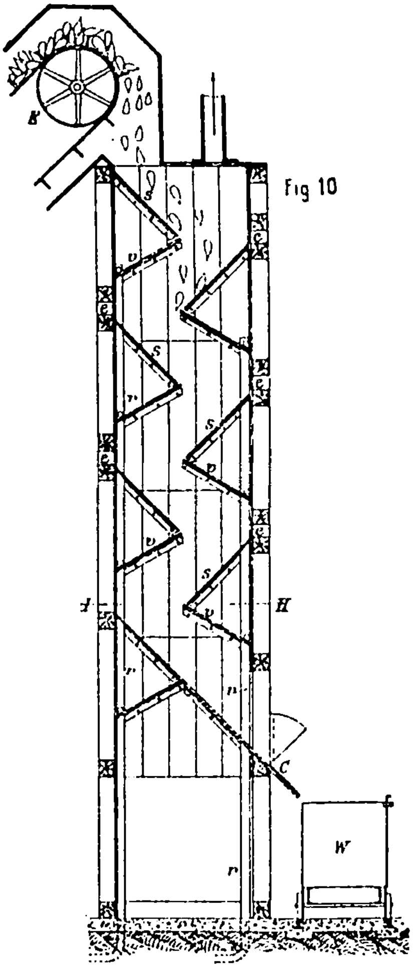


Fig 10

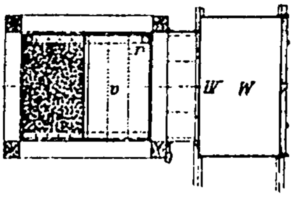
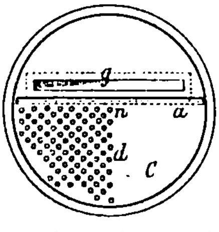


Fig 11

F. Rothe Söhne, Bernburg (Germ. Pat. 29,077, April 11, 1884). In order to increase the total section of the heating space in the vacuum pan, divide it into two parts by the divisional plate *a* (Figs. 12 and 13). The lower space C contains a number of horizontal pipes *d*, which open into the spaces E and F, and are connected with the upper part B by means of the elbow *g*. By using either the pipes *n* or the elbow *g*, which communicate between B and E, circulation of the liquid will take place in the direction indicated by the arrows. Steam is admitted into the space C, which is completely shut off from the liquid, and passes round the pipes *d*, which are full of the liquid, and along the lower side of the divisional plate *a*. It also heats the tube plates of the chamber C, and communicates heat to the solution in the spaces E and F.

Fig.12



The circulation of the liquid in this apparatus greatly assists the evaporation.

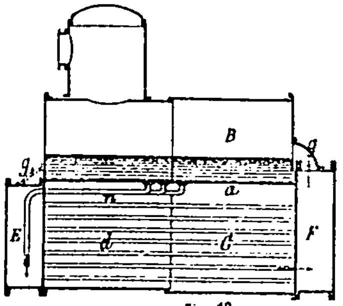


Fig 13

Fig. 14 represents another arrangement to keep the liquid in continual motion during evaporation in a vacuum pan, and is the patent of J. P. Liebe, Dresden (Germ. Pat. 27,614, October 19, 1883). A knee pipe *a* is fixed to the bottom on the pan, having a valve *c* to which the T-pipe *i* is attached. The pipe *c*, closed at the top, surrounds the tube *k*, one end of which *q* opens into the vacuum pan, while the other terminates as shown in the T-piece *i*. When the stop-cock *p* is opened, the air pump is started, and the solution to be evaporated is allowed to enter by *n* until it reaches *q*. The cocks *n* and *p* are

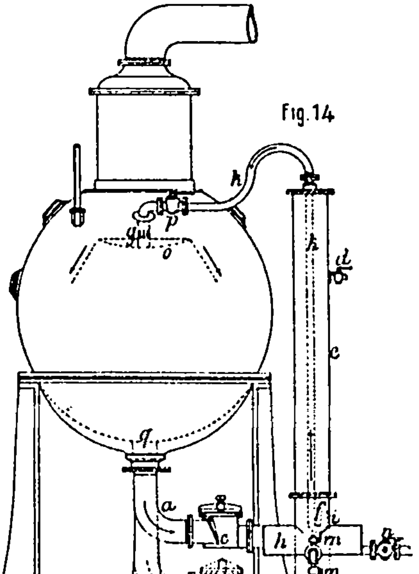


Fig.14

now shut, and the vacuum destroyed by opening the cock *d*. By shutting *d* and again opening *p*, the solution standing over *f* is drawn through *h* in the vacuum pan, then another portion of the liquid passes through the valve C into *i*, from which it is drawn again through *h* into the pan. The liquid is thus caused to circulate intermittently. If it be desired to make a continual discharge at *g*, the arrangement of pipes *a* and *h* are placed lower, as indicated by the dotted lines. By partially opening the cock *n* a continuous feed will be maintained. —W. M.

On the Production and Examination of Starch. Dingl. Polyt. Journ. 255, 209.

In the *Zeitschrift für Spiritus-industrie*, p. 762, 1884, O. Saare gives the results obtained in a factory where the process was conducted without grinding, the potatoes being passed through a rasping machine. Two experiments were made with 4800kg. washed potatoes (I. Seed; II. Zwiebel), and these quantities were worked into starch giving:—

	I.		II.	
	Kg.	Per cent.	Kg.	Per cent.
Wet pulp	1,786	.... 37·2	2,381	.... 47·5
Dry pulp	—	.... 4·6	—	.... 5·7
Green starch	1,213	.... 25·6	1,233	.... 25·7
Dry starch	—	.... 13·3	—	.... 13·0
100kg. potatoes gave starch in the pulp	2·96	.... —	4·05	.... —

The following figures show a comparison between the yield obtained when only a rasping machine is used, and when, in addition to this, grinding is employed, from 100k. of starch worked:—

STARCH.	SEED.		ZWIEBEL.	
	Without Grinding.	With Grinding.	Without Grinding.	With Grinding.
Obtained in form of green starch	81·8	87·1	76·3	85·5
Lost in the pulp........	18·2	12·6	23·7	11·5

This table shows the advantage attending the employment of grinding for increasing the yield of starch. It should be noted, however, that the factory with the grinding plant employed a rasp cutter, while in the other case a rasping machine was used, which does not disintegrate the material so finely.

According to L. Bondonneau, errors are made in the estimation of the total solids in starch, when damp starch is heated to quickly over 60° C. When the starch contains acids, sugar is formed during the drying. He recommends the starch to be spread in a very thin layer, heated slowly to about 60° C. for three hours, then kept at 100° C. for one hour. If the starch be acid he adds a few drops of ammonia and water, and proceeds as before.

On the other hand, Saare (*Zeitschr. für Spiritus-industrie*, 595, 1884) heats 10grm. starch to 40° or 50° for one hour, and then keeps it at 120° for five or six hours. Numerous experiments have shown that for commercial analyses five or six hours' drying at 120° suffice to drive off all the water. He also says that the error caused by the conversion of starch into glucose, when starch having an acid reaction is dried, can be safely neglected. The amount produced when the starch contains ·1 per cent. of sulphuric does not influence the estimation of the water, consequently there is no need to add ammonia to acid starch.

S. Schubert (*Monatshefte für Chemie*, p. 472, 1884) has investigated the behaviour of starch granules on being heated, and concludes that changes in form and structure, especially the lamination, are not solely determined by the amount of moisture in the air-dried granules, but depend on the different physical and chemical properties of each layer. The effect of heat is simply to make these differences more prominent. The starch granule, under the influence of high temperature, is altered in such a manner that the layers, rich in granulose[*], are at once converted into soluble starch and dextrin, while the principal portion of the layers, rich in cellulose only, undergo this transformation after a time. When starch which has been heated is treated with water of the ordinary temperature, the soluble starch and dextrin are removed, and an organised residuum is left, which resembles the form and structure of the original granule, and contains small quantities of unchanged granulose. This can be further removed by extracting with water, and it appears to be so altered that it can be easily subjected to chemical changes. The granules give up the greater portion of the granulose to the water, thereby losing in mass but not in volume, retain their structure, and consist chiefly of cellulose.

Granules extracted in this way become coloured blue, or, at least, bluish violet, on the addition of sulphuric acid and iodine, and the individual layers swell up and separate from one another. When the granules are heated more strongly with a drop of water, on the object glass, a deep blue colouration ensues. The residue is not a uniform body, but contains, in addition to cellulose and granulose, a transformation product of starch similar to dextrin which reduces Fehling's solution, is coloured red by iodine, and undergoes decomposition on treatment with water. At present it cannot be decided whether this body is erythrodextrin or not. If a large quantity of the granules be triturated with pounded glass, the substance yielding the red colour cannot be removed by repeated treatment with cold water, which presumably would not produce decomposition or alteration; on the contrary, by the addition of iodine the residue becomes more intensely coloured, while the rotatory power remains practically unaltered.—W. M.

Preparation of a Substitute for Caoutchouc. Dingl. Polyt. Journ. p. 255, 215, 1885.

According to J. Haug and C. Hoffmann, St. Petersburg, a substitute for caoutchouc is made by washing the skins of hares, rabbits, and other small animals in water, removing the hair in lime-water, and then boiling them, along with 5 per cent. commercial glycerine and a small quantity of water, in a Papin's digester until solution takes place. A thick tough mass results, which can either be dried on wire nets or immediately worked up further. Twelve parts of this mass are melted, along with twelve parts glycerine, in a water bath, and then one part of a concentrated solution of bichromate of potash is added. The liquid mass is poured into moulds, and allowed to harden under pressure. This mass resembles vulcanised rubber, and can better withstand heat.—W. M.

Recovery of Waste India-Rubber. A. Gutensohn, London, and A. Cox, Bristol. Eng. Pat. 1994, January 23, 1884.

The scraps, cordings, India-rubber cloth and so on, are first classified into three groups: (*a*) those containing iron and steel, (*b*) those in which the adherence of the rubber to the cloth is not great, and (*c*) those in which the adherence is considerable. Group (*a*) is put in a solution of copper, such as sulphate or nitrate of variable strength, according to the material to be treated, the iron dissolved and copper is precipitated. The pieces of fabric are then added to (*b*) or (*c*) as the case may be. Group (*b*) is placed in hot water containing a little ammonia. After a short time the rubber can be easily stripped from the cloth. Group (*c*) is placed in a bath of ammonia diluted with water to a degree variable with the character of the pieces treated. In two or three days, more or less, the rubber can be easily stripped.—J. T.

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[*] *Note by Abstractor.*—The author does not state precisely what the term granulose should include, but from the context it would seem to signify the substance of starch granules other than cellulose.

Improvements in Apparatus for Mixing and Elevating Sugar in Course of Process. J. H. Johnson. Communicated by "La Compagnie de Fives-Lille," of Paris, France. Eng. Pat. 2344, January 29, 1884.

THE apparatus constituting this invention is principally applicable to the mixing and elevating of sugar in the state of masseeuite and other saccharine products, prior to their treatment in the centrifugal machine or turbine, but is applicable for treating other pasty or semi-fluid materials. "The employment of the said mixing and elevating apparatus is attended with considerable advantage in the manufacture of sugar, as the expense of conveying the sugar from the backs to the centrifugal apparatus is entirely obviated, the mixing apparatus being arranged to receive the sugar directly from the backs or other receptacles, and to mix, elevate, and deliver it directly to the centrifugal apparatus. The materials are thus transferred from one apparatus to the other without the intervention of hand labour, and without the waste which ensues during the operation of charging the centrifugal machine by hand. The improved apparatus enables the materials that are to be treated in the centrifugal machines, or turbines, to be mixed and elevated with facility and economy, and may be either permanently fixed in the vicinity of the backs or receptacles containing the said materials, or mounted on wheels so as to enable it to be readily moved from place to place." The apparatus consists essentially of a forcing apparatus, or pump, acting in combination with a mixing cylinder, which stirs and mixes the materials and reduces them to a state fit to enable them to pass readily through the pump. "The apparatus can stand at a very small elevation from the ground, and consequently admits of being fixed and charged with great facility. It occupies but little space, and the cost of its construction is not great." When the apparatus requires to be moved frequently, in order to be brought up close to the backs, or receptacles, containing the masseeuite or materials that are to be mixed and elevated or transferred to the centrifugal machines or other apparatus, it is preferably mounted on wheels and actuated by a small independent engine, supplied with steam either by means of a pipe capable of being readily connected and disconnected with or from steam supply pipes of the works, or by a small independent boiler attached to the apparatus. —H. A. R.

A New Colour Starch. Emil Capitaine, London. Communicated by Drumm & Co., Kaiserslautern. Eng. Pat. 5260, March 21, 1884.

THIS invention consists in mixing with starch in the course of its manufacture any suitable brown or yellow colouring matter, so that when an aqueous solution is made of this colour starch, it simultaneously, with the starching operation, communicates a cream colour to goods steeped therein. Any required shades can be readily obtained either by mixing varying quantities of the colouring matter with the starch, or else by making the starch very strongly coloured in the first instance, and then adding the necessary quantity of ordinary white starch.—W. M.

Improvements in Gloss Starch. W. H. Carman, of London. Communicated by Wendel Zwick, of Newmühle-Albersweiler, Germany, starch manufacturer. Eng. Pat. 12,326, September 12, 1884.

THE following mixture is claimed as a substitute for borax in giving a gloss to starch or linen. It is stated that the action of borax is very detrimental. The inventor takes from 2 to 8lb. of white wax, stearine or spermaceti according to the gloss required, and perfumes with about 20 drops of otto of roses, fennel oil or oil of aniseed (or any other suitable essential oil). The melted mixture is then treated with about half-a-pound of caustic soda lye of 10°. After some further boiling, the melted mixture is diluted with about 4 gallons of water. "The above quantities are about sufficient to make 2cwt. of gloss starch." The fluid is mixed with the starch in a half-dry state, and the water is removed in drying pans. The wax, stearine or spermaceti, and the volatile oils remain with the starch, which is dried and treated in the usual way. Besides the gloss said to be imparted, the inventor claims a beneficial action of the above mixture on the fabric.—H. A. R.

Process for Extracting and Saccharifying Ingredients of Amylaceous Substances by Treatment with Malt. John Imray, Chancery Lane, London. Communicated by Leon Cuisinier, Paris. Eng. Pat. 14,271, October 22, 1884.

THIS specification contains much detail for the treatment of amylaceous materials, by which the starch is converted into dextrin, maltose and soluble substances, for use in the brewery, distillery or syrup factory. The claims bear especially upon a maceration in presence of malt and subsequent heating to a temperature not exceeding 75° C., by a source of heat also not exceeding that temperature, whereby the starch is converted mainly into dextrin. A further addition of malt to the liquor cooled to 50° C. carries the conversion into maltose and readily fermentable sugars.—W. M.

A New or Improved Manufacture of Filtering, Disinfecting, Deodorising and Decolourising Medium. G. H. Ellis, Exeter. Eng. Pat. 14,774, November 8, 1884.

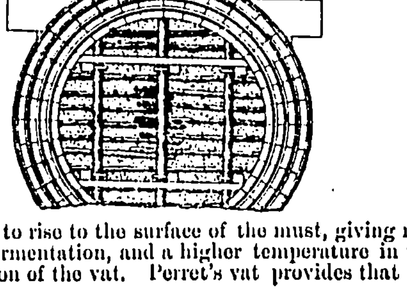
LIGNITE or Bovey coal, found in the Bovey basin, near Bovey Tracey and Newton Abbot, in the county of Devon, and containing, when calcined, from forty to eighty per cent. of siliceous matter, with a small quantity of alumina and iron, is subjected to a red heat in retorts and superheated steam introduced, which has the effect of removing the volatile hydrocarbons more readily, and also of extracting portions of the sulphur. The residue is transferred to tanks, and allowed to cool. It is then ground to powder as may be required, or it may be quenched by throwing water over the carbonised material immediately it is withdrawn from the retorts. The material known as "deads," found in association with the lignite beds, and consisting of an admixture of carbonaceous matter and detached particles of lignite, with clay, is treated in a similar manner. This filtering material is said to possess the following advantages:—(1) It is superior to animal charcoal for water filtration, inasmuch as it is free from calcium phosphate. (2) It does not favour the growth of the lower forms of animal life, but is an active agent in their destruction. (3) It is valuable for the filtration of acids. (4) It can be manufactured and supplied at less than half the price of animal charcoal. (5) It is a good deodoriser and decolouriser; and (6) it can be used with economy and advantage for sugar refining, as it causes less waste, in consequence of retaining less of the saccharine matter.—D. B.

XVI.—BREWING, WINES, SPIRITS, Etc.

Perret's Wine Fermenting Vat. Dingl. Polyt. Journ. 254 [12], 486.

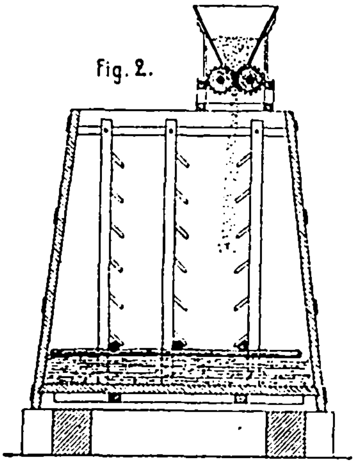
MICHEL PERRET recommends a process introduced by him with success twenty years ago, for avoiding the evils attending fermentation in presence of the husks. The husks tend to rise to the surface of the must, giving rise to acetic fermentation, and a higher temperature in the upper portion of the vat. Perret's vat provides that the

Fig. 1.



husks are kept in fairly equal distribution throughout the progress of fermentation. To do this, it is fitted with vertical supports, carrying pins inclined downwards, whilst hurdles are laid in horizontally, which rise with the must during the filling, but are kept submerged at different depths by the rows of pins. The husks are arrested in their ascent by the hurdles. When the wine is run off, the husks and hurdles come down together, the latter falling readily on account of the downward inclination of the pins.—G. H. B.

Fig. 2.



On the Amount of Extractive Matter in Wines of the Year 1882. A. Henecke. Biedermann's Cent.-Blatt. 1883, 6, 424.

According to the author, the wines of the year 1882 contained exceptionally small proportions of extractive matter, sugar and alcohol, this circumstance being explained by the fact that the vintage was by no means a good one, large quantities of the grapes being more or less unsound.—E. G. C.

The Preparation of a New and Improved Substance to be used in the Manufacture of Alcohol. Herbert John Haddan. Communicated by Constant Coster, Brussels. Eng. Pat. 2330, January 29, 1884.

Slices, pulp, or juice of Jerusalem artichoke, is submitted to the action of acids, sulphuric by preference, or *malt!* When acid is used a steam pressure of from 1 to 3 atmospheres is employed according to the quantity of acid, but the material is heated under a pressure of 3 atmospheres, then cooled to 50° C. before it is submitted to the action of malt. The syrup obtained is called "glucose of Jerusalem artichoke," and is said to be completely fermentable in 12 hours. The improvement claimed is the saccharification under pressure, and the preparation thereby, of a syrup richer in alcohol-yielding matter, and more rapidly fermentable than is obtained by the process called the "Procédé Champonnois."
—C. O. S.

Improvements in the Process of Fermentation and in the Manufacture of Alcohol, Beer, Wine and the like. Johan Henri Loder. Eng. Pat. 8800, February 4, 1884.

These improvements consist in adding various substances such as aniline, orthomonoamidophenol, sulphocyanide of potassium, etc., to fermenting liquids.—C. O. S.

Improvements in the Process of Fermentation in order to Prepare Alcoholic Solutions of Colouring Matters. Johan Henri Loder. Eng. Pat. 2606, February 4, 1884.

Nitric acid, trinitroresorcine, orthomononitrophenol, with sulpho-cyanic acid, aniline and sundry such things are added to fermenting liquids, and it is claimed that alcoholic solutions are thereby obtained which may be employed for the fabrication of wines—red, white or sparkling ones—and by distilling them for the fabrication of an alcohol containing aromatic principles; they may serve to prepare vinegar (*sic.*) or also for dyeing purposes.—C. O. S.

Improvements in the Treatment of Grain or other Materials for the Production of Alcohol therefrom. G. Epstein, London. Eng. Pat. 6557, April 19, 1884.

The patentee aims at conducting the operation of mashing and distilling in a continuous manner. He also states that he has found it more advantageous to work with a strong wort than with a weak one; a density of from 30° to 50° on Sykes's saccharometer gives results. The mashing is conducted in the usual manner, and either acid or diastase may be used. The apparatus specified consists of three parts: (1) the converting vessel provided with a stirrer and steam coil, (2) a straining and cooling vessel, (3) a fermenting vessel. The mode of working is as follows:—After the grain has been mashed it is allowed to descend into the cooling vessel, in the upper part of which is a straining plate; when the temperature has reached the proper point it is run into the *fermenting* vessel, which is closed to the air, and fermentation commenced; the air requisite to the operation being supplied by a pump. When the attenuation has proceeded far enough, it is forced by the pressure of *the carbonic acid gas, given off during fermentation,* back into the converting vessel, fresh material is added and another mashing operation started. The alcohol distilled off by the elevation of temperature passes into the rectifier, and the operation first described is repeated. If acid be used for the mashing, the quantity used in the second mash may be smaller than in the first stage. The patentee claims generally the process as described.
—C. C. H.

An Improved Method of and Apparatus for the Preparation of Malt. Henri Seney. Eng. Pat. 6620, April 21, 1884.

The grain is steeped in the usual way, and then distributed on rotating endless "aprons" made of wire gauze, placed one above the other in a series of four, and overlapping each other alternately. The thickness of the grain is regulated by adjustable registers, placed above the apron, and at right angles to the direction of its motion. The grain distributed on the top apron is carried forward, and falls on to the next below; this again carries it onward, and allows it to fall on the third apron, and so on until the fourth is reached; from this it is taken up by elevators, and again distributed on the top apron, and the process continued until the germination is considered complete, when it is passed on to an elevator which carries it to the kiln. The apparatus is provided with a "sprinkler," by which the grain in falling from one apron to another receives the necessary amount of water in the form of spray. The claim is for *the elevators, endless aprons,* sprinkler, etc.—C. O. S.

Apparatus for Purifying Distilled Spirits. W. R. Lake, London. Communicated by the Cushing Process Company, Boston, U.S.A. Eng. Pat. 10,740, July 29, 1884.

In that class of apparatus in which the liquor is purified and matured, by forcing through it air previously purified and heated, much alcohol is frequently carried away from the condenser by the current of air. The present invention comprises a condenser preferably of cylindrical shape, immersed in a cooler charged with cold water by the port. The condenser is connected with a tank, which contains the spirit to be treated. Hot air is passed into the tank. The condensed spirit passes through holes, and returns back into the tank, whilst the air and uncondensible gases pass away by a pipe.
—J. T.

XVII.—FOOD PRESERVING, MEATS, Etc.

Process for Preserving Meat. Dingl. Polyt. Journ. 255, 215, 1885.

MIGNON and ROUART cool meat, fish, etc., in a Carré ice machine to 20°, then quickly transfer these articles to tinplate boxes, and solder them up. Each box has a wooden casing, and this again is enclosed in a vessel which is filled with a freezing mixture, and protected outside by a covering of wood and cork shavings. In one experiment 525lt., out of an original freezing mixture of 1000lt. were melted after 46 days, and the temperature in the middle of the freezing mixture had risen to 4°. The meat was perfectly good.—W. M.

Improvements in the Preparation of Salt, Saltpetre, Sugar, and other Antiseptic Substances for use in the Preservation of Food. E. Sonstadt, Cheshunt. Eng. Pat. 6304, April 12, 1884.

THIS invention consists in adding calcium iodate to any food preservative, or to any mixture of preservatives. The proportions may be from one per cent. up to five per cent., and it may be added in either the solid or liquid form. When the solution is used, the solubility may be increased by the addition of neutral sodium or potassium citrate. The claim is made for the application of calcium iodate in the preparation of antiseptic substances used in the preparation of food.—C. C. H.

Antiseptic Compound. William Hibbert, Clarence Street, Cheetham, Manchester. Eng. Pat. 13,358, October 9, 1884.

TO one gallon of a solution of magnesium chloride, 50° T., add ½oz. magnesium bromide, ½lb. common salt, and ¾lb. potassium sulphate. The same ingredients may be used in other proportions. The mixture is available for the preservation of meat, and other animal and vegetable substances.—J. M. H. M.

Improvements in or Relating to the Preparation of Beverages or Foods. W. H. Thew, Liverpool. Eng. Pat. 14,965, November 13, 1884.

THE object of this invention is to manufacture a preparation of condensed peptonised milk and cocoa, in which the flavour of peptonised milk is disguised, and the constituents of milk are enriched by the addition of the nutritious and stimulant principles of cocoa, in an easily digestible form, also a preparation of coffee and peptonised milk. The milk to be peptonised is heated to about 60° C., then a decoction of cocoa is added and bicarbonate of soda (½oz. per gallon), or phosphate of soda (½ to 2oz. per gallon). An extract of pancreas is next added, the mixture kept at about 60° C. for 1-2 hours. By the action of the pancreatic ferment, the insoluble constituents of the cocoa are rendered almost completely soluble. When the peptonising is finished, sugar is added and the liquid is boiled for a few minutes, to kill the ferment, and then concentrated in a vacuum pan, until it contains about 20 per cent. of water. In preparing condensed peptonised milk and coffee, an extract of coffee is added to the peptonised and sweetened milk, preferably during the later stages of condensation.—W. M.

XVIII.—SANITARY CHEMISTRY, DISINFECTANTS.

Spread of Cholera through the Medium of Water. Dingl. Polyt. Journ. 254, 444.

MAREY (*Compt. Rend.* 99, 667) shows from the cholera reports of the year 1832, 1849, 1850, 1854-55, that the spread of the epidemic in the various districts of France where the disease raged, is distinctly traceable to contamination of water supplies. This confirms the statements of Koch (*Dingl. Polyt. Journ.* 252, 261).—C. F. C.

Communication of Cholera by Drinking Water. The Medical Chronicle [6], 518-522. Abstracts from various Reports, etc., by Prof. J. Dreschfeld.

KOCH'S results have been already briefly given (see this Journal, iv. [1], 59). The investigations of the English Commission, as reported by Klein, have led them to the following conclusion, among others. There is direct evidence to show that water contaminated with choleraic evacuations, and containing, of course, the comma bacilli, when used for domestic purposes, including drinking, by a large number of persons, did not, in the case of the tanks near the Saheb Bagan, produce cholera. Dreschfeld remarks with regard to this evidence: "Against this negative evidence Koch would cite his positive evidence, as seen from his report." Pettenkofer speaks chiefly against the contagious nature of cholera, especially against its propagation by drinking water. His statement about the disappearance of the cholera from Fort William, with the improved drainage of the Fort, is contradicted by De Renzy, who clearly showed that the cholera disappeared with the improved supply of drinking water. Klebs, in his second paper, gives an interesting instance of the propagation of the cholera by contaminated drinking water. Genoa is supplied with water by the Acqua Nicolay, Acqua Galliera and the Civico Acquedotto. Of 270 cases of cholera, where the water supply could be determined with precision, 256 received their drinking water from the Acqua Nicolay—*i.e.*, 92 per cent. The workhouse, with 1200 inmates, is supplied from the Acqua Nicolay, but the supply was cut off immediately after the cholera broke out, and though the cholera raged in this district, by no means a very salubrious one, no case of cholera occurred in the workhouse. As to the source of the contamination, it was found that cholera cases occurred nine to ten days previous to the outbreak in Genoa in the small village of Busalla, situated near the mountain river Scrivia, whence the Acqua Nicolay draws its water supply; the bed of the river is very stony and the water very shallow, and it is well known that the inhabitants of Busalla dried their clothes on the stones standing out from this brook.—W. S.

Improvements in the Preparation of Agents to be used in the Treatment of Sewage and other Similar Putrescible Matters. W. C. Sillar and J. W. Slater, Kent and Middlesex. Amended specification. Eng. Pat. 1144, September 3, 1883.

THE inventors prepare crude chloride of aluminium or chlorides of aluminium and iron, for use in the purification of sewage, etc., in the following manner. An aqueous solution of sulphate of alumina (obtained, for example, by lixiviating with water any shales or other minerals containing sulphate of alumina either alone or together with sulphate of iron) is mixed with solution of calcium chloride, in equivalent proportions, the deposit of sulphate of lime then formed is used for manurial or other purposes, and the liquid—which consists, according to circumstances, of a solution of aluminium chloride or of the chlorides of aluminium and iron—is employed for the purification by precipitation of sewage, etc.—E. G. C.

A New Disinfectant. Alfred J. Shilton, Birmingham. Eng. Pat. 852, January 7, 1884.

THIS preparation consists of a solution in water of potassium iodide, iodine and chloride of ammonium, the proportions being 2oz. of potassium iodide, 1oz. of iodine, and 16oz. of ammonium chloride, to each gallon of water. The disinfectant may be diluted for use with 15 or 20 times its bulk of water, and either exposed to the air in shallow vessels or diffused by means of a spray producer.—E. G. C.

An Improved Compound for the Elimination of Dissolved Matter from Water. P. A. Maignen, London. Eng. Pat. 3038, February 9, 1884.

THE improved compound is the mixture, in a powdered form, of substances "of a differential order of action" to precipitate the salts in a water. The patentee states

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that the consequence of the addition of such a mixture is the successive precipitation of the various inorganic bodies present, the reactions occurring seriatim, with a "slight overlap." The materials composing the mixture may be lime, alum or sulphate of alumina, etc., "calcined or ground soda or soda-ash"; but the proportions and the materials themselves may undergo variation "so long as they constitute a compound in a powdered state of chemical equivalents with constituents of differential order of action." The claims are: (1) The compound composed of the re-agents specified above ,with the alternative addition of permanganate of potash; (2) an alternative compound composed of "chemical equivalent in a powdered state acting upon the water in the same differential order as hereinbefore described."—C. C. H.

Improvements in and Relating to the Filtration and Purification of Water and means Employed Therefor. W. R. Lake, London. Communicated by J. W. Hyatt, Newark, New Jersey, U.S.A. Eng. Pat. 3593, February 19, 1884.

THIS specification describes a method and apparatus for the continuous purification of water. The process consists of injecting into the water, whilst on its way to the filtering bed, any substance, such as iron or salts of iron, which will coagulate the impurities succeeded by a re-agent—*e.g.*, lime or the alkaline earths which combines with the first re-agent and precipitates the excess of the iron. The water is then passed on to a bed of filtering material preferably composed of sand and communited iron; the precipitated matters are retained on the filter and the water issues from the apparatus bright and clear. The apparatus consists of a water meter, also actuating an automatic injector adjusted for forcing the proper amount of re-agents into the water and a vessel holding the filtering bed. The whole invention is covered by six claims.—C. C. H.

Improvements in Disinfecting Litter Powder or Compounds. J. Brown, Dewsbury. Eng. Pat. 5175, March 20, 1884.

IN order to prevent the spread of infectious diseases, such as "foot and mouth disease," among cattle the patentee manufactures a disinfectant litter by saturating sawdust, peat or other fibrous or absorbent vegetable matter with carbolic acid and creosote; fifty per cent. of the acid and five per cent. of creosote giving good results. The claims are: (1) The manufacture of a disinfectant litter from vegetable matter or porous earth by the addition of carbolic acid and creosote; (2) the use of the litter for the purpose set forth.—C. C. H.

Improvements in the Manufacture of Carbolate of Lime for Disinfecting and Deodorising Purposes. J. B. Austin, Bristol. Eng. Pat. 5447, March 25, 1884.

To produce a cheap disinfectant the spent lime from gas works is heated to drive off the sulphur, carbonic acid and other volatile products, which have combined with it in the purification of the gas. It is then combined with 25 per cent. or more of carbolic acid, producing a carbolate or sulpho-carbolate of lime. To produce a mixture of uniform composition it is passed through a disintegrator or other apparatus. The claim is the manufacture of a carbolic powder from the refuse lime of gas works treated as described.—C. C. H.

Improvements in Apparatus and Arrangement of Apparatus for Filtering Water and other Fluids. G. Weddell, Newcastle-on-Tyne. Eng. Pat. 6208, April 10, 1884.

THE filtering apparatus is constructed in two parts, the upper part receiving the unfiltered water and the lower part the filtered water. Between the two there is placed the filtering chamber; this consists of a cylindrical vessel packed with animal charcoal and covered at each end with paper, cotton, or asbestos cloth, the whole filtering medium being retained in place by perforated diaphragms of porcelain, glass, or other suitable material. The patentee claims as novel the filtering chamber, as described and arranged.—C. C. H.

Improvements in Disinfecting Powders. C. Lowe, Reddish. Eng. Pat. 6401, April 16, 1884.

A MIXTURE of refined carbolic acid, cresylic acid, or other coal-tar acids, in a concentrated state, is mixed with infusorial earth or "Kieselguhr;" such earths are capable of absorbing an equal weight of the acids named. The proportions usually employed are 40 to 75 parts of the concentrated acids to from 60 to 25 parts of the infusorial earth. This powder is specially suitable when heated in vessels for disinfection by the vapours of the acids. The patentee claims the manufacture of the powder as described.—C. C. H.

An Improved Method of Purifying Water Contaminated by Dissolved Vegetable Matter. A. Irving, Wokingham. Eng. Pat. 8056, May 22, 1884.

THE patentee states that the vegetable matter contained in a water is held in solution by means of certain organic acids. The removal of these may be effected by bringing the water in contact with metallic iron when the soluble salts of that metal are formed; exposure to oxygen at once causes the precipitation of the iron as the peroxide, the acids being resolved into carbonic acid and water to carry this into effect for small quantities of water such as used for domestic purposes. The specification shows a filtering apparatus consisting of a reservoir for holding the iron deep enough to contain sufficient water to keep it covered, a filtering bed of sand and gravel, an air chamber through which the water falls and becomes aerated, a conical piece covered with cloth to separate the oxide of iron precipitated by oxidation, and a receiver for the purified water. In operating upon large bodies of water the iron is brought in contact with it in shallow ponds or lakes, the required amount of oxygen furnished by causing the stream of water to fall over a succession of cascades, and the precipitation oxide of iron removed by filtration through beds of sand. The claims are (1) the process as described, (2) the small domestic filter, (3) the process for purifying large quantities of water as specified.

—C. C. H.

Improved Process for the Manufacture of a Mineralised Carbon for Filtering, Disinfecting, and other Purposes. J. W. Gatehouse, Bath. Eng. Pat. 9102, June 17, 1884.

THE inventor intimately blends with lignite (preferably dried and granulated) mineral matter containing large amounts of silica, either free or combined, such as felspar, diatomaceous earths, grit stones, sandstones, volcanic tufa, greenstone, siliceous clays, etc., in such proportions that the product obtained by distilling the mixture in suitable retorts shall contain from 20-60 per cent. of mineral matter, and from 80-40 per cent. of carbon, according to the purpose for which it is required.—E. G. C.

Improvements in the Collection, Treatment and Disposal of Sewage, etc. Donald Nicoll, Westminster. Eng. Pat. 10,275, July 17, 1884.

THE inventor calls his method the "Cloacina" system, and he collects the excrementitious refuse from dwellings in metal tanks of suitable sizes and shapes, each possessing a removable air-tight cover and containing two framed metal strainers (also removable) so arranged as to divide the tank into two compartments; one of the latter contains sand, grit, gravel or other similar material, and the other is filled with animal or vegetable charcoal. Each tank has an opening in the lower part of one of its sides, masked by galvanised iron-wire network, and serving for the escape of the effluent, which is "perfectly innocuous, and can be discharged with safety to the public health down any open ditch, sewer, river or watercourse." These tanks are to be placed, with their lids off, in subways faced with non-absorbent bricks and constructed in the footpaths or as near as possible to the dwellings, the sewage from which is to be received. Over each tank is a manhole of framed ironwork, coated outside with the usual paving of stone, metal, or asphalte, as the case may be. From time to time the manholes are opened and, by means of a funnel, dry earth, crushed burnt clay, street mud, lime, salts of alumina, sifted dry ashes, or soot, as may be preferred, can be shot down upon the matter in the tanks beneath. When sufficiently charged these are to be removed in wagons provided with cranes and hand-winches for the purpose of hauling the filled tanks out of the subway and replacing them by empty ones. During the removal of the charged tanks their air-tight covers are screwed on, and the lateral outlets before referred to are also closed by screwed lids. The wagons are furnished with flanged wheels, gauged for the nearest tram or railway, and with removable broad wooden tyres so that the operations of moving the tanks, depositing street mud, etc., can be carried on at night with as little noise as possible. A further part of this invention relates to the treatment and disposal of the sewage matter collected in the tanks, and consists in the construction of fireclay kilns, with double roofs, so arranged that offensive vapours pass through perforations in the inner roof and are conveyed back to the fire by a return or connecting pipe. The charged tanks are placed in these kilns for the purpose of drying, not charing, the contained sewage matter, which is thus solidified and rendered suitable for pulverisation and sale in the form of a powder, similar to that known on the Continent as "poudrette." In rural or thinly-populated districts pits are to be substituted for the above-mentioned subways, for the reception of the tanks.—E. G. C.

Hygienic Candles. A. Wright, London. Eng. Pat. 11,963, September 3, 1884.

TALLOW, stearine or other material used for making candles is mixed with 5-10 per cent. of oil of eucalyptus or cageput oil, or a mixture of these. In some cases a small proportion of carbolic acid may be added.—J. T.

XIX.—PAPER, PASTEBOARD, Etc.

Manufacture of Paper capable of Resisting Fire and Damp. Dingl. Polyt. Journ. 1884, 254, 315. Ger. Pat. 28,139, December 21, 1883.

W. HERRE proposes to add to the pulp during the process of grinding in the rag-engine solutions of certain salts which, by mutual decomposition, form insoluble compounds. The solution which is added first contains zinc sulphate, or chloride, or calcium chloride, or acetate, whereupon tallow, soap, glue, and alum are added. After having been thoroughly mixed the mass is formed into paper, which, however, before being dried is once more passed through a bath of the same, or similar, composition to the solution used for mixing with the pulp in the rag-engine, and ultimately impregnated with a solution of catechu.—F. M.

Preparation of Cellulose for Paper-making. Dingl. Polyt. Journ. 255 [3], 111.

A. BEHRIN COETHEN has patented the following process (Ger. Pat. 28,219, September 29, 1883) for preparing cellulose and glucose from wood: After being carefully barked and cleaned, the wood is reduced to shavings or sections in A (*Fig.* 1). The sections pass through a trap to *a* on the drying loft *b*, and are there subjected to preliminary desiccation, after which the wood passes through *c* on to the drying loft proper, B. The base of the same consists of perforated iron-plates. Canals *e* introduce fresh air under the base, which is heated by a system *f* of tubes fed with condensed water. Hot-air passes into B_1 and B, then through the loose wood drying the same, and finally escapes by the canals *g* to the flue. If the wood is subsequently to be treated with alcohols, it is necessary to remove turpentine from coniferous woods by a distillation at 160° C. By means of the hopper *h*, and the manhole *i*, the wood is passed into the iron cylinder C, which is furnished with an agitator.

The cylinder is jacketed in its lower half; and the jacket fed with steam of six atmospheres The subsequent drying of the wood takes place by means of the water which has been used for cooling the worms, etc. Water or steam is introduced by the cock *l*, and passes out by *m*. After closing the manholes and the cocks *n*, the cocks *o* are opened, until enough steam has passed in through *p*, which follows the side of the cylinder. The turpentine (b. pt. = 157° C.), mixed with aqueous vapour, passes through *q*, *r*, and *s*, to the cooler *t*, where the gases are liquefied, and flow into S. After all turpentine has passed over, steam and cock *o* are shut off, and *n* and *v* opened. The agitator brings the wood into contact with fresh air coming in through *n* and *p*, and escaping through *v* and *w*, into the flue. After being dried the wood is conveyed by means of D to the first floor, and thence into the boiler E, where it is to be freed from resin. When filled, two-thirds with wood, oil of turpentine, or fusel oil, is introduced from G by means of a_2 and F, so as just to cover the wood.

By means of b_1 the temperature is brought somewhat over that of the liquid contents, and an excess of pressure in the cylinder avoided by the cooler c_1. When all resin is dissolved the pulpy mass is conveyed into the extractor H, through f_1 and g_1. A false bottom h_1 allows of the removal of the resin solution by means of steam. In the receiver J, separation takes place, the resin solution forming the upper layer on the water containing extractive matter. The former is distilled in K, and the latter conveyed to the receivers R and M, over the glucose boiler. The pulp remaining in the cylinder, on the false bottom h_1, contains usually certain carbohydrates and salts insoluble in water; and in the case of coniferous woods the salts of iron present much impede subsequent bleaching. This pulp is conveyed into the glucose boiler O, and there treated with the required quantity of very dilute sulphuric acid. After boiling, the pulp is washed till free from acid. The waste liquor from this operation contains notable quantities of glucose; and is, therefore, also conveyed to the cisterns P. The pulp is then ready for bleaching, or else is pressed and dried.

W. Flodquist's process (Figs. 2, 3, and 4), according to *Papier Zeitung*, 1884, p. 1436, differs from other sulphite processes, mainly in the fact that the SO_2 passes over moist bones, which have been freed from fat, and so produces a solution containing bisulphite and phosphate of lime. The SO_2 passes through *g*, and with the trap *w* placed as in Figs. 2 and 4, follows the arrow-head through *a*, *i* and *k*, into the first absorption chamber *l*. Of 10 chambers two are supplied with bones, and eight with limestone. The action is continued until the solution in D has the required density of 5° B., for wood, which is reduced to 2·5° B. for straw. For particulars respecting the management of the apparatus, and the preparation of glue, etc., the original should be consulted, as these are incapable of useful abstraction.

The arrangement for preparing paper-pulp consists mainly, as shown in Fig. 5, of a spherical revolver, fed direct, at high pressure, and hence provided with a safety valve *l*. The boiler is made of steel plates lined with lead, which is affixed by means of screws provided with large lead-covered heads.

When pulping sawdust, the same is filled into about half the boiler, covered with the above solution, and then boiled for eight or nine hours, with a final pressure of about 70lb., and with four revolutions per hour. The boiled mass is then reduced as required. Wood is boiled similarly to sawdust. For straw, after chopping, comes a six hours' boil with the lye at 2·5° B.—H. A. R.

Improvements in the Manufacture of Paper. John Henry Johnson. Communication from Jules André, Meyrueis. Eng. Pat. 151, January 1, 1884.

THIS process, which does not appear to contain any novelty, consists in causing two webs of paper of different quality, while still wet, to combine together by pressure. Thus united, the duplex paper is dried and finished in the ordinary way. The specification is accompanied by drawings, showing how the method can be worked either with two cylinder machines or with a combination of a cylinder and an ordinary Fourdrinier machine.—E. J. B.

Improvements in the Manufacture of Paper, Paper Pulp, Pasteboard, Millboard and Papier Maché, and such substances applicable for Cabinet and all kinds of Structural Purposes. Eng. Pat. 2316, January 29, 1884.

This remarkable process consists in boiling peat, moss or wood fibre, in a liquid composed of potash, chloride of lime, quicklime, sulphuric acid and acetic acid. Pulp so prepared is bleached by a solution containing the above re-agents, together with sulphur.—E. J. B.

Improvements in Uninflammable Pulp for Paper. Baron Louis Moser Dulfus, London. A Communication from Julien Ponty, of Brussels. Eng. Pat. 3780, February 22, 1884.

The object of this invention is to produce a material in itself uninflammable and incombustible, which, when applied to the manufacture of paper, etc., will render the same capable of resisting a fierce fire. This material is also to have the important property of constituting an insulating material for electrical conductors of all kinds, and to be not attacked by acids or corrosives. The principal constituents of this uninflammable powder are: (1), asbestos fibre, which is reduced and bleached in any convenient way; (2), fossil powder, which is a substance containing about 80% silica, 10% fossil wood, 5% lime and 5% iron, and which is bleached by chlorine or otherwise. This material, when crushed, is mixed with an equal quantity of "neutral" silicate of soda at 40° Bé. Besides its uninflammability, this light material has the property of rendering the paper soft to the touch, and of affording a good hold for the size, "as each particle is hollow." In some cases this material may be replaced by sulphate of alumina, or any other uninflammable material; (3), a pulp obtained from animal fibre—*e.g.*, waste silk, silk rep, or other materials having similar qualities as regards cohesion and felting properties combined with fineness of fibre, which will thus not flare up when ignited. A pulp from Baobab bark, which has these properties, may be substituted for the silk or other pulp. The proportions will vary according to the nature, etc., of the paper to be produced. For fine writings the following proportions are recommended:—

Asbestos	80-90%
Fossil powder	5-10
"Neutral" silicate at 10° Bé	5-10
Animal (silk) pulp	1-5

If the sizing to take place in the engine, 1% of the following "size" must be added:—

Water	130 parts.
China clay	100 "
"Neutral" silicate at 30° Bé	9 "

When the paper is to be tub-sized, the water and China clay will be 65 and 47 parts respectively, and 12 parts of resinous soap are added. For moulding ornaments direct from the pulp, or for coating electrical conductors, the proportions are somewhat altered, and a small quantity of cerosine added. The following proportions are recommended for such a case:—

Asbestos	70-80%
Fossil powder	10-15
Silicate at 35° Bé	5-10
Silk pulp	1-3
Cerosine	1-5

In applying this pulp for insulating wires, the coating varies *from 1-5mm., and if the wires are submarine, some* suitable non-putrescible material is added.—H. A. R.

Improvements in Means for Rendering Objects Uninflammable. Baron Moser Dulfus, London. A communication from Julien Ponty, of Brussels. Eng. Pat. 3780, February 22, 1884.

Inflammable objects, such as theatre decorations, are to be rendered uninflammable as follows:—The object to be rendered incombustible is covered with paper made according to specification No. 3780 of even date. This paper *is affixed by means of a special uninflammable* adhesive mixture, which is composed of 80-85 per cent. of sodium silicate of 40° Bé. mixed with from 10-15 per cent. of fossil powder ground fine. After two or three days *the mixture is to be decanted and used.—H. A. R.*

Improvements in the Method or Process of, and Apparatus for, Draining, Concentrating, Clarifying, and Consolidating or Solidifying Substances and Liquids, especially applicable for Filtering Paper Mill Sludge, and Consolidating the Substances contained therein. J. Foulis, Musselburgh, N.B. Eng. Pat. 4202, March 1, 1884.

The object the patentee has in view is the separation of the solid from the liquid matter contained in a material such as the refuse waters from a paper mill. The material is first settled in tanks in order to eliminate as much of the water as possible. The residue is then submitted to pressure in a suitable apparatus, of which two kinds are described. The first kind of apparatus shown is similar to a paper-making machine; the sludge is fed on to an endless band and carried between rollers, the upper one bare, the lower covered with felt. The pressure eliminates a further quantity of water, which is absorbed by the felted roller, the solid matter adhering to the bare roller, and being scraped therefrom by a blade, is carried on to the next pair of rollers, where it is similarly treated. The second form of apparatus shown resembles a filter press with a single cell. A cylinder is fitted with a cover, the face is grooved and covered with felt, a piston fits the interior of the cylinder, the face of which is similar to the cover, and it can be drawn back or forced forward by a hydraulic ram; the material is admitted to the interior of the cylinder by a valve which does not permit egress of the liquid when pressure is applied. The cylinder being charged with the sludge by drawing back the piston, the pressure is applied and the water expressed out; on drawing back the piston, a second charge is admitted, and the operation repeated until a solid cake of the matter recovered is left in the machine. In some cases the liquid is heated before being subjected in order to coagulate the albuminous matters.

—C. C. H.

Improvements in Apparatus for making Wood-Pulp. W. R. Lake. Communicated by C. Storey, of Providence, Rhode Island, and George E. Marshall, of Turner's Falls, Mass., both in U.S.A. Eng. Pat. 12,346, September 12, 1884.

This invention relates to the apparatus used in making wood-pulp, and comprises the following objects: Reduction in the cost of production, firstly by facilitating the operation, and secondly by reclaiming to a large extent the chemicals employed. Also the simplification of the process by rendering it more automatic than has hitherto been the case. Further to simplify the process of constructing the digestor used in the operation, and finally to provide the same with an improved lining which shall meet the requirements of the operation. In the present process for disintegrating woody fibre, by boiling under pressure. Sulphurous acid is used to dissolve the resinous and other cementitious matter enclosing the said fibres. The liquid in which the fibre is boiled is water, containing from one to four per cent. of sulphurous acid in combination with lime or magnesia in varying proportions. This liquid covering the fibres is heated in a jacketed boiler of a non-corrosive metal. A steam space is left in the upper part of the boiler. Whilst the boiling is proceeding large amounts of gases are produced, and which take up oxygen from the water, fibre and chemicals forming sulphuric acid which may injure the fibre by too violent action. Hence occasional blowing off is required, and this entails considerable time, attention and care, besides the gases being totally lost. Another difficulty lies in the sudden expansion of the gases by which the top-pressure in the digestor is increased, and the free circulation in the interior is interfered with. To avoid these difficulties and to prevent the loss of chemicals, the steam space of the digestor is connected with a condenser surrounded with cold water, and regulated by some form of a steam-trap or valve by which any liquid having condensed is automatically removed without any reduction in the steam pressure of the digestor. When blowing off the chemicals are reclaimed by a separate condenser connected with a tank fitted with stirrers by means of which the acid can

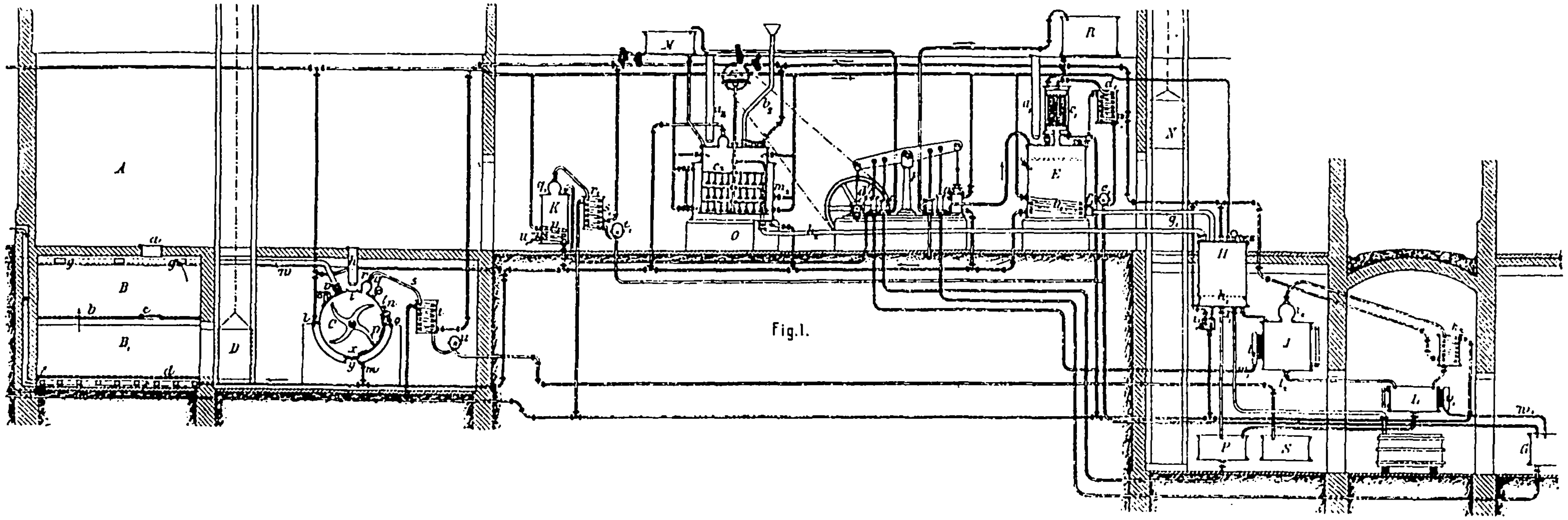

Fig. 1.

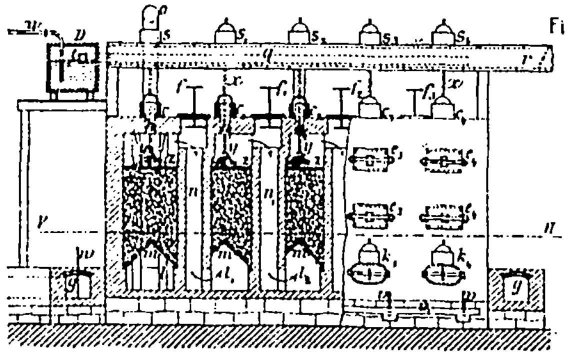

Fig. 3.

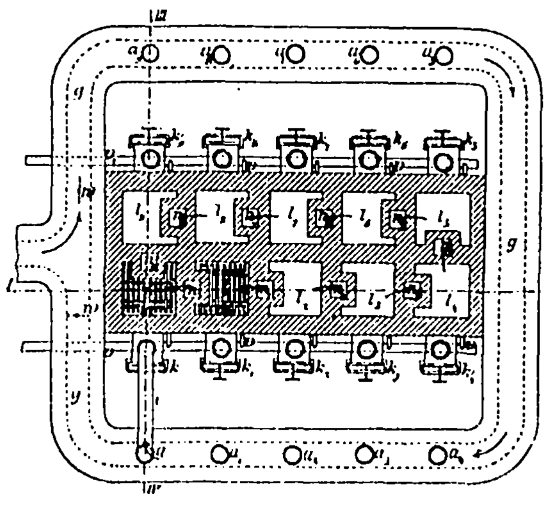

Fig. 2

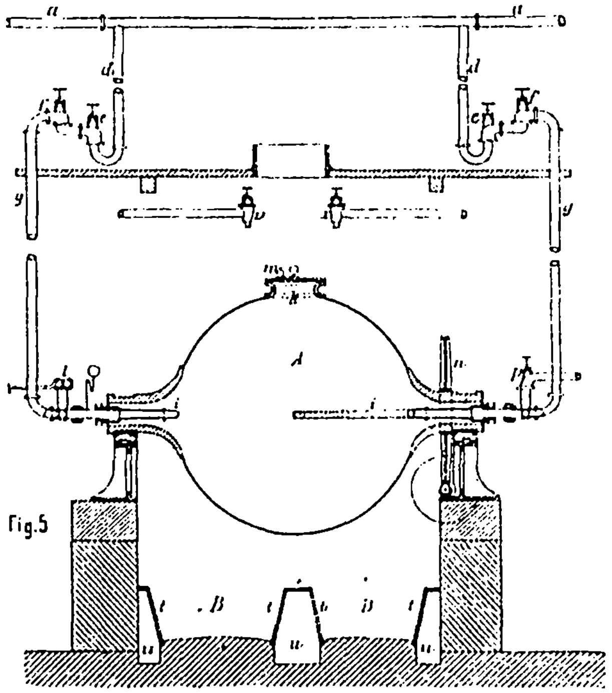

Fig. 5

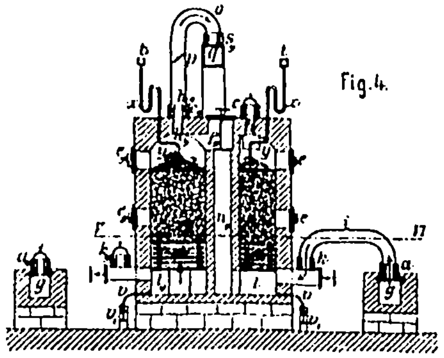

Fig. 4.

be again combined with any desired base, or be otherwise utilised. By this improved apparatus the pressure is gradually raised, but accumulation of gas and consequently of pressure avoided, the circulation made rapid, and hence all parts of the charge are brought under the action of heat and of the liquid. The burning or blackening of the fibre from the formation of sulphuric acid is also prevented. The chemicals not taken up by the cementitious matter are regained, the attention and labour required are reduced, and a superior and more uniform product than hitherto is obtained.—H. A. R.

Improvements in and Relating to Boilers for use in Treating Wood, etc., with Acids. H. H. Lake, London. Communicated by C. W. Flodgvist, Gothenberg. Eng. Pat. 15,188, November 18, 1884.

The object of the improvements is the prevention of the fracture of the lead lining of vessels used for this purpose, and which is due to the buckling produced by the unequal expansion between the lining and shell of the vessel consequent upon heating. Instead of making the lining, and the shell also, in one continuous piece as heretofore, in which case the difference of expansion reaches a maximum, the vessel is made up of a number of flanged pieces, made from steel, cast or wrought iron, each piece being covered with lead also beaten out over the flanges, the whole being firmly held together by bolts; thus forming one vessel with a continuous lining. The complete vessel is provided with lead lined covers fitted with manholes, and in some cases may be suspended on trunnions at right angles to its longer axis, gearing being provided for its revolution when necessary; one trunnion serving for the introduction of steam and the other for its exit. The claims are: (1) a boiler composed of a number of rings bolted together as described; (2) lining the rings with lead flanged over the joints so as to form a packing between the joints of the cylindrical rings.—C. C. H.

XX.—FINE CHEMICALS, ALKALOIDS, ESSENCES.

Santonine Manufacture at Orenburg, Russia. Dingl. Polyt. Journ. 1884, vol. 254, p. 316.

The proprietors of the Santonine Works at Orenburg, H. Mauer & Co., contradict the statement made by C. O. Cech, of Moscow (Dingl. Journ. 1884, vol. 253, 475), that the said works, after three years' existence with a very modest production, had now entirely discontinued the manufacture of santonine, saying that they had been in full work ever since they have been established. The factory is fitted up in the best possible manner (the boilers being fired with the seed refuse), due regard being taken for enlargements, whereby the future production may be easily raised to three times that of the present (900kilos. per month), in case the demand for santonine should continue to increase.—F. M.

A Fourth Alkaloid in the Box-tree. G. A. Barbaglia. Berichte, 17, 2655.

A quantity of alkaloid substances may be extracted from the leaves and branches of the box-tree by the usual method, and these are then treated in the manner given for the separation of the three colouring matters: buxverdin, buxorubin, and buxoxanthin. These substances are dissolved in alcohol, and the liquid neutralised exactly, with an alcoholic solution of oxalic acid. The white precipitate formed is separated, boiled repeatedly with distilled water, dissolved in dilute aqueous oxalic acid, and finally shaken with ether after making alkaline with sodium carbonate. The ethereal solution, after filtering from buxinidin, is concentrated, and on cooling, a new alkaloid, to which the author has given the name of "parabuxinidine," crystallises out. This alkaloid forms thin transparent prisms, insoluble in water, soluble in alcohol. The author intends to complete his investigations on this body.—J. B. C.

Improvements in the Process of Manufacturing Iodoform, Bromoform, and Chloroform. Theodor Kempf. Eng. Pat. 8148, May 23, 1884.

This invention relates to the manufacture of the above substances by electrolysis from suitable halogen compounds of the alkalis and alkaline earths—in the presence of alcohol, aldehyde, acetone, and of heat. The solutions are electrolysed in an atmosphere of carbonic acid and with constant heating. To obtain iodoform in large crystals, iodide of potassium is dissolved in alcohol of $20^{\circ}/_{\circ}$ and electrolysed as stated. To obtain bromoform or chloroform, the electrolysis is similarly conducted, but without carbonic acid.—T.

XXI.—EXPLOSIVES, MATCHES, Etc.

Process for the Recovery of the Waste Acids from the Manufacture of Nitro-Glycerine. Dingl. Polyt. Journ. 255, 216, 1885.

According to W. Poltsch (Ger. Pat. 29,664, October 31, 1883), when these waste acids, consisting of sulphuric acid, nitric acid, and unknown organic nitro bodies, are heated to 105°, the nitro compounds are decomposed and oxidised, at the expense of the nitric acid, to carbonic acid. So much heat is evolved in this re-action that the still undecomposed nitric acid, along with the lower oxides of nitrogen, is driven off, and pure sulphuric is left. He employs a closed stone or lead vessel, three to four metres high by forty centimetres wide, provided with a false bottom. The upper space is filled with flints. A pipe opening just above the false bottom introduces hot air, whereby the flints become warm. The waste acids are allowed to enter the vessel at the top through a funnel, in thin streams, and passing over the heated flints are decomposed. The oxides of nitrogen, along with the introduced air, pass away by a tube through cooling pipes into a Woulff's bottle, where more air is added, whereby nitric acid is produced. The denitrated sulphuric acid flows through the false bottom, and is led away from the lower space by a leaden pipe.

—W. M.

Improvements in the Preparation of Blasting-powder from Nitrated Cellulose. W. Gedge. A Communication from W. F. Wolff and Max von Förster. Eng. Pat. 13,522, October 13, 1884.

Thin plates of nitro-cellulose, prepared either by compressing the finely divided wet substance into sheets or by slicing blocks of the compressed material, are sawn into strips, the strips into grains; or the strips and grains may be stamped out of the plates. The grains may be "coated" by immersing them in a solvent of the nitro-cellulose, or in liquid paraffin with the object of rendering them less liable to crumble. It is stated that by so proceeding, a dense powder is obtained having an effect similar to that of compressed gun-cotton in large pieces.—W. D. B.

Experiments with Dynamite Cannon. Dingl. Polyt 254 [6], 248, 1884.

Recent experiments conducted at Fort Lafayette with the dynamite cannon briefly described in Journ. Soc. Chem. Ind. 1884, p. 532, have given favourable results. With a projectile weighing 19kilos., and not charged with dynamite, the deviation from the line of sight was 0·61m. (? range). When the projectile was loaded with charges of ordinary dynamite weighing from 6·8kilos. to 7·6kilos. the deviation in all cases was less than 0·914m. The explosion of the charges formed large craters, from which earth and stones were projected 30m. into the air. Pointing seaward, at an angle of 22°, and with an air pressure of 36 atmospheres, the range of a projectile weighing 10kilos. was 2000m. F. H. Snyder (Scientific American, 1884, 50, 295) adopts the arrangement here figured for projecting from an ordinary 12-pounder Rodmann gun with the usual charge of powder, a shell of dynamite in place of a ball. The premature explosion of the dynamite by the powder used for its propulsion is sought to be prevented by means of buffers. B is the shell attached to the wooden rod A. In the foremost part of the shell the dynamite is placed, and between the rod and the explosive, the buffer D, consisting of a caoutchouc cylinder with numerous air spaces, E, closed with the tightly-fitting cap K, is provided. When the weapon is employed for naval purposes the wooden rod is of considerable length, and is shaped as shown at C, but when used on shore the rod is quite short and plain. Between the end of the rod and the charge of powder, the buffer arrangement T, S, W, X, L, F, is placed; it serves as a wad, and also to prevent extreme violence of concussion being communicated to A. S, S, W are discs of wood, or paper pulp. F is a concave disc of copper, which acts as a spring. L, L, leather washers, to prevent escape of gas. In the experiments, a shell containing 2·27kilos. of dynamite was thrown 1200m. from a 12-pounder Rodmann gun, using a charge of sporting powder. The success of these trials has induced the authorities of the United States to direct more extended experiments at Sandy Hook.—W. D. B.

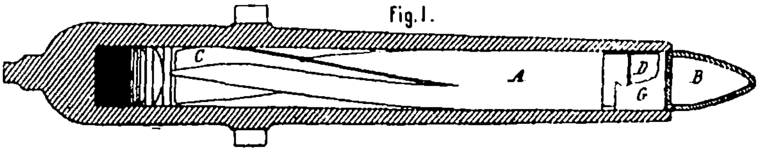

Fig. I.

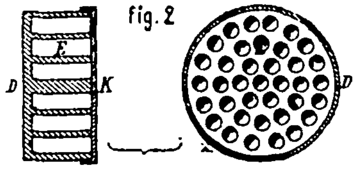

fig. 2

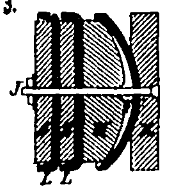

Fig. 3.

XXII.—GENERAL ANALYTICAL CHEMISTRY.

On Toughened Filter-Paper. E. E. H. Francis. Proc. Chem. Soc. [3], 19.

Filter-paper which has been immersed in nitric acid (sp. gr. 1·42) and washed with water is remarkably toughened, the product being pervious to liquids, and quite different from parchment-paper made with sulphuric acid. Such paper can be washed and rubbed without damage, like a piece of linen. The paper contracts in size under the treatment, and the ash is diminished; it undergoes a slight decrease in weight, and contains no nitrogen. Whereas a loop formed from a strip 25mm. wide of ordinary Swedish paper gave way when weighted with 100-150grm., a similar loop of toughened paper bore a weight of about 1·5kilo. The toughened paper can be used with the vacuum pump in ordinary funnels without extra support, and fits sufficiently closely to prevent undue access of air, which is not the case with parchment-paper. An admirable way of preparing filters for the pump is to dip only the apex of the folded paper into nitric acid and then wash with water; the weak part is thus effectually toughened.

—W. S.

The Detection and Estimation of Iodine. Ernest H. Cook, B.Sc. (Lond.). Proc. Chem. Soc. [3], 19, 20.

The usual tests for iodine when existing as an iodide are rendered somewhat difficult by the circumstances that nitrous acid liberates bromine as well as iodine, while, if an excess of chlorine be employed, colourless chlorides of bromine and iodine are formed. These difficulties become of importance when it is desired to detect small quantities of iodides in the presence of comparatively large quantities of bromides, or when a quantitative estimation is to be made of the iodine.

To avoid these difficulties, the author proposes to use hydrogen peroxide, which is added to an acetic acid solution. Under these circumstances, the whole of the iodine is separated from the iodide, while bromides and chlorides are unaffected.

Details of the methods of employing the test for qualitative and quantitative purposes are given; in the latter case, the iodine is extracted by means of chloroform, the solution is washed with a little water to remove hydrogen peroxide, and the titration of the iodine then effected in the usual manner.

Mr. C. E. Groves and Dr. Stevenson both testify to the value of the nitrous acid method for determining small quantities of iodine in presence of much chlorine.

—W. S.

A Quick Method for the Estimation of Phosphoric Acid in Fertilisers. J. S. Wells, Columbia College. Proc. Chem. Soc. [3], 20.

Finding the ammonium molybdate method too long and tedious when many analyses of fertilisers had to be done, the author has adapted Joule's citric acid method as a gravimetric process. He employs two solutions: A, consisting of citric acid 900grm., ammonia solution (rel. den. 0·92) 1400cc., water 500cc.; and B, a strong solution of magnesium citrate. 1*grm. of the fertiliser* is fused with sodium carbonate and nitrate, dissolved in nitric acid, and the silica filtered off. To the filtrate some of solution A is added, and the whole allowed to stand for half an hour; enough *of solution B is then added to precipitate* the phosphoric acid. For the author's experiments, a test solution was made up of sodium phosphate, calcium chloride and ammonia-iron alum, so as to contain P_2O_5, 19·83 per cent., CaO, 25 per cent., Fe_2O_3, 3 per cent.; equal portions were taken for analysis, the comparison of his results with theory being given in a table. He compares his own method with the ammonium molybdate method on several fertilisers, with the following results:

	Ammonium citrate method.	Ammonium molybdate method.
1.	4·23 per cent.	4·23 per cent.
2.	18·36 ,,	18·18 ,,
3.	3·12 ,,	3·61 ,,
4.	11·01 ,,	13·92 ,,

Mr. F. J. Lloyd believes the accuracy of the results as above obtained would depend on, and vary with, the kind of material tested.—W. S.

The Estimation of Chromium. H. Peterson. Dingl. Polyt. Journ. 254 [6], 271, 1884.

According to the author, the methods devised by Blair and Schöffel are not to be recommended. The following is considered better: *The metal is finely pulverised and* 0·5grm. is warmed with 35cc. of dilute sulphuric acid. The solution is treated with a slight excess of concentrated potassium permanganate solution to destroy any soluble hydrocarbons, the ferric sulphate is reduced with zinc,—and, if care be taken to leave a trace of ferric salt, there is no fear of the chromium sulphate being reduced,—

the solution diluted with water to one litre and the iron titrated with standard permanganate. After titration the solution containing much sulphuric acid is heated to boiling, and permanganate solution, of which 1cc. corresponds to 0·01grm. of iron, run in slowly till much peroxide of manganese has separated; or, with greater safety, potassium permanganate is added till the permanent red colour of the solution proves it to be present in excess. The excess is reduced with manganous sulphate, and the solution which now contains the chromium in the form of chromic acid is filtered through a large filter, the residue being washed with hot water. The filtrate when quite cold is treated with a known excess of iron-ammonium sulphate, of which the amount remaining unoxidised by the chromic acid is determined by titration with standard permanganate.—W. D. B.

On the Valuation of Calcium Tartrate. Dingl. Polyt. Journ. 254 [12], 491.

According to L. Weigert (*Zeitschrift für analytische Chemie*, 1884, S. 357), besides crude argol, also calcium tartrace now serves as raw material for the manufacture of tartaric acid compounds. In both cases the dealings are based on tartar-degrees—that is, the percentage of calcium tartrate contained is expressed in the equivalent quantity of potassium bitartrate. Thus 260 parts of crystallised calcium tartrate are equivalent to 188·11 parts of potassium bitartrate, or one tartar-degree is 188·11 : 260 = 1·3821kilos. calcium tartrate in 100kilos. of the crude substance, whilst 1 per cent of a kilogram of (pure) calcium tartrate = 0·7235 of a tartar-degree (Weinstein-Grad). In order to estimate its technical value the calcium tartrate is decomposed by boiling with potassium carbonate into neutral potassium tartrate and calcium carbonate. After filtering off the residue the solution is evaporated and mixed with acetic acid to bring about the formation of potassium bitartrate, and this is washed with alcohol and titrated. At the same time the excess of potassium carbonate which is used should be as small as possible, the acetic acid also added only in corresponding excess, the washing sufficiently long continued, and the mixture of potassium carbonate and tartrate, after treatment with acetic acid, must still contain some water on treatment with alcohol in order to obtain exact results. The analytical details are as follows:—5grm. of powdered calcium tartrate are placed in a small flask with 30cc. of a 10 per cent. solution of potassium carbonate, and heated for one or two hours in a water bath. The flask itself becomes strongly attacked, but this is without influence on the result. The contents are filtered into a porcelain basin, and washing with hot water is continued until the washings cease to react on red litmus paper. The filtrate is evaporated in the porcelain basin on the water bath to about 5cc. (not to dryness). 5cc. strong acetic acid are now added and moved about in the dish so as to come in contact with every portion of the residue, and the whole is placed on a water bath for one or two minutes, as the acetic acid does not react quickly enough in the cold. 100cc. of 90 per cent. alcohol are now added and allowed to stand several hours. Then it is filtered and washed with about 100cc. of 80 per cent. to 90 per cent. alcohol until 10cc. of the washings, after dilution with twice the volume of water, require only one or two drops of standard potash for neutralisation. Such a standard potash solution is used as serves for estimations of acidity in wines, and of which 1cc. corresponds to 0·01grm. tartaric acid or 0·0250Sgrm. potassium bitartrate. To the quantity of tartar found by the titration 0·0165grm. tartar is added as correction for the above quantities of liquids used, or, if 5grm. calcium tartrate is used, 0·33 per cent. tartar must be added. These corrections allow for the quantity of tartar remaining in the solutions, and are the mean of many estimations. In testing calcium tartrate for carbonate a titration is admissible, not on account of the difficulty of decomposition or the want of sensitiveness of the indicator, but on account of a remarkable displacement of the neutral point, occasioned by the impurities present in the crude calcium tartrate, the error sometimes being as much as 10 per cent. calcium carbonate. The carbonic acid must therefore be evolved for estimation by weight or volume. Calcium tartrate is sometimes met with in commerce, which contains potassium bitartrate; this is especially the case, if, in the working up of the lees, too small a quantity of hydrochloric acid has been used. It is recognised that one part of hydrochloric acid (HC_2) is capable of dissolving 5·15 parts of potassium bitartrate, but this is only true for a boiling temperature. In the cold double that quantity is always necessary in order to keep the potassium salt in solution, otherwise a retrograde action takes place. If only so much hydrochloric acid has been added in the working up of the lees, as to keep the tartar dissolved whilst hot, some of the tartar separates out, part remaining in the cloths of the press, and part separating out when the solution is treated with the powdered chalk.—G. H. B.

Errata.—In February number of this Journal, on p. 107, col. 2, line 2 from top, after "thick," insert "tar." On p. 112, col. 1, lines 15 and 62 from top, and in col. 2, lines 11 and 15 from top, for "isabonaphtha," read "ssabonaphtha." On same page, col. 1, lines 1 and 2 from foot, omit the word "however."

New Books.

A Practical Treatise on the Raw Materials and Fabrication of Glue, Gelatine, Gelatine Veneers and Foils, Isinglass, Cements, Pastes, Mucilages, etc., based upon actual experience. By F. Dawidowsky. Translated from the German, with extensive additions, including a description of the most recent American processes, by William T. Brannt. Illustrated by thirty-five engravings. Philadelphia: Henry Carey, Baird & Co., Industrial Publishers, Booksellers, and Importers, 810, Walnut Street. London: Sampson, Low, Marston, Searle, and Rivington, Crown Buildings, 188, Fleet Street; 1884.

This is an 8vo volume, bound in cloth, and containing 284 pages of subject-matter, a table of contents, and a copious index. It is also illustrated with thirty-five engravings. The subdivisions of the table of contents, forming also the chapter headings, are as follows: I. What is Glue? II. Raw Materials and Manner of Preparing them for the Manufacture of Glue; III. Fabrication of Glue; IV. Plan and Arrangement of a Glue Factory; V. Gelatine and its Preparation; VI. Uses of Glue and Gelatine; VII. Different Varieties of Glue and Gelatine, and special directions for their preparation; VIII. Cements and Pastes; IX. Pastes and Mucilages; X. Present Status of the Fabrication of Glue.

Alkali Tables for the Use of Chemical Merchants, Manufacturers and Brokers. By Oswin Bell. Newcastle-on-Tyne: Boazman, Dickson & Co., 25, Quayside; 1885.

A small pamphlet measuring about 3½ by 2½in., with paper cover; price 1s. The tables are arranged after the fashion of a ready reckoner, and are such as to enable one to see at once the value per ton from the value per unit per cwt., less various discounts.

The Gas Manager's Handbook, consisting of Tables, Rules, and useful information for Gas Engineers, Managers, and others engaged in the Manufacture and Distribution of Coal-gas. By Thomas Newbigging, Memb. Inst. of Civil Engineers. Fourth Edition. Illustrated. London: Walter King, 11, Bolt Court, Fleet Street; 1885.

Small 8vo volume, handsomely bound in morocco leather and gilt, containing 382 pages of subject-